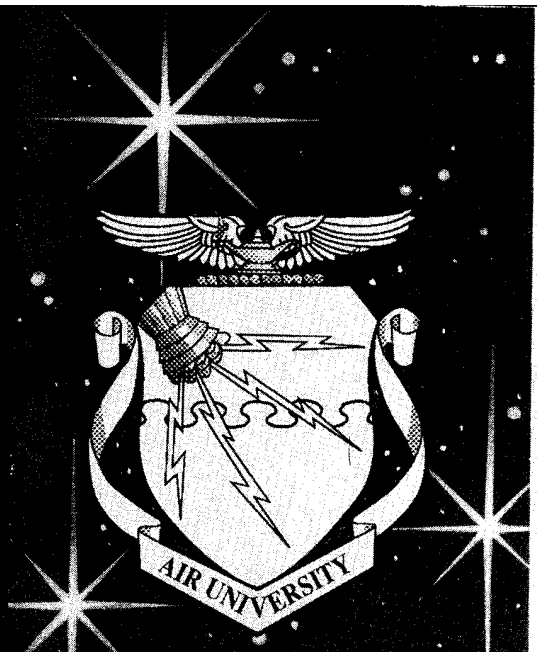

AIR UNIVERSITY

Strategic Paralysis
An Airpower Theory for the Present

JASON B. BARLOW, Major, USAF

Strategic Paralysis
An Airpower Theory for the Present

by

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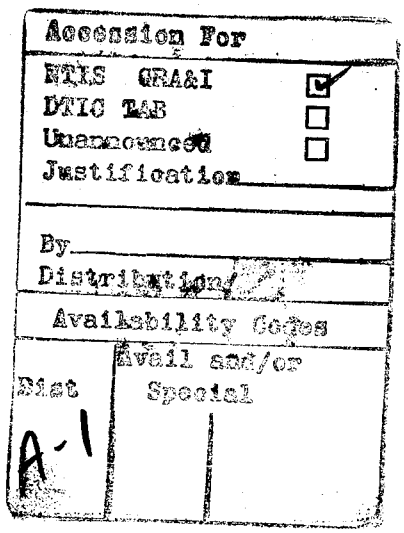

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About the Author

Maj Jason B. Barlow (BS, University of Hawaii; MPA, Golden Gate University) is a U-2/TR-1 pilot. A recent graduate of the inaugural class of the School of Advanced Airpower Studies, he was subsequently assigned to the Strategy Division at HQ USAF/XO, the Pentagon. Also a graduate of Air Command and Staff College, he was previously assigned as a U-2/TR-1 instructor pilot and flight examiner at Beale AFB, California. Other assignments have included an ASTRA tour at the Pentagon and serving as a T-38 instructor pilot at Beale AFB and at Reese AFB, Texas.

Abstract

"All wars are costly in lives and treasure!" Through the ages, this fundamental truth has driven military strategists to search for a quick and inexpensive victory in battle. But the limits of technology allowed for only so much innovation on land and sea. Then, just as the horrors of war reached their zenith in the trenches of World War I, the airplane promised to take the battle directly to the enemy's most vital targets. Victory, some reasoned, would now go quickly, easily, and with less expense to those who could command the air. But early airpower results were not all that impressive. Airplanes never achieved the unambiguous, inexpensive, or decisive victory its advocates envisioned. Ever since, military men have sought a better understanding of airpower and how best to use this unique weapon to defeat an enemy.

Until recently, airpower technology, employment, and doctrine were not up to the task. Most military theorists are in agreement about the final objective sought in any military conflict. The end, usually and ultimately, requires a change in the enemy government's behavior. What is not so clear is how this change is achieved and, more specifically, the role airpower plays. This paper suggests an independent strategy for the application of airpower and discusses the conditions necessary for its success: strategic paralysis.

The method or objective of strategic paralysis is to attack or theaten selectively those strategic or national level targets that most directly support the enemy's war-making efforts and will to continue with his current behavior. Strategic paralysis warfare should result in a change in the enemy's behavior at a lesser cost to both sides because airpower assets—not ground troops—are the primary weapons. Why airpower? It is the only weapon that can provide the near simultaneous shock to the enemy's central nervous system necessary to induce paralysis. To achieve success, strategic paralysis requires four key ingredients: (1) correctly identifying the enemy's national elements of value (NEVs); (2) high technology; (3) an enemy dependent upon a well-developed, modern, and vulnerable infrastructure; and (4) aerospace control. The bulk of this study is devoted to defining this strategy and bettering our understanding of the first ingredient, that of choosing the best targets for attack.

The popular, or Clausewitzian, notion of strategic centers of gravity, is ambiguous and static. The search for a single target which causes the collapse of an entire enemy country is often futile—and perhaps more fantasy than fact. Most societal elements are interdependent, self-compensating, and entirely more resilient than usually recognized. This paper delineates an approach to strategic targeting that takes into account the interaction of all societal elements. The national elements of value model is such an approach. It defines seven categories of targets, called NEVs, as: leadership, industry, armed forces, population, transportation, communication, and alliances. Understanding NEVs is critical for successfully employing a strategy of strategic paralysis as they embody the enemy's capability and will to continue the

conflict. Four assertions are made concerning the proper selection and evaluation of NEVs: (1) they vary in importance from country to country; (2) they are self-compensating; (3) the enemy's leaders must be rational in the sense that they can be influenced by the threat or destruction of valuable portions (affecting capability or will) of their physical infrastructure; and (4) their proper identification requires a significant intelligence base.

Strategic paralysis is a strategy whose time has come. Given the growing concern for cost and casualties on all sides, strategic paralysis warfare makes sense. It may not work in every case, but its vast potential for success cries out for further consideration. Strategic paralysis is an airpower strategy for the present.

Chapter 1

Introduction

The day may not be far off when aerial operations with their devastation of enemy lands and destruction of industrial and populous centres on a vast scale may become the principal operations of war, to which the older forms of military and naval operations may become secondary and subordinate.

— Lt Gen Jan C. Smuts

Since the airplane first took to the skies, military men everywhere have sought a better understanding of airpower and how best to use this unique weapon to defeat an enemy. The goal of this paper is to suggest a new theory, or strategy, for the application of airpower and to discuss the conditions necessary for its success. This new theory is called *strategic paralysis.*[1]

Most military theorists are in agreement about the final objective sought in any military conflict. The end, usually and ultimately, requires a change in the enemy government's behavior. The required change in the government's position can occur in at least three ways: First, key governmental leaders could be killed and replaced by a more sympathetic group; second, the government could be overthrown, either by popular revolt or from a faction within; or, third, the country's leaders could simply change their minds and stop what it is they are doing that is bothersome.[2] What is not so clear is how this change is achieved and, more specifically, the role airpower plays in it.

The goal of strategic paralysis is to selectively attack or threaten those targets that most directly support the enemy's ability or will to continue his current behavior. However, to achieve success, strategic paralysis requires four key ingredients: (1) the right targets; (2) high technology; (3) an enemy dependent upon a well-developed, modern, and vulnerable infrastructure;[3] and (4) aerospace control.[4] The bulk of this essay is devoted to bettering the understanding of the first ingredient, choosing the best targets. The other three are not addressed separately, but as integral parts of the strategy and targeting model proposed.

This study concentrates on the concepts and framework for a strategy of strategic paralysis and the specific conditions under which it is most likely to succeed. It is divided into six chapters. This chapter provides a road map and an overview of the main ideas. Chapter 2 introduces the theory of strategic paralysis and presents a framework for understanding where it fits into the most commonly accepted strategies for war. Chapter 3 begins an in-depth review of the requirements necessary for strategic paralysis to succeed by focusing on the issue of target selection. It is divided into two sections. The

first explores the history and theory of target selection, concentrating on the targeting theories of Carl von Clausewitz and Baron Antonine Jomini. The second section expands the study to include the airpower targeting theories of Giulio Douhet, Billy Mitchell, B. H. Liddell Hart, and John A. Warden III. After this review, chapter 4 continues the task of determining a country's most valuable elements by surveying some of the more popular targeting theories from 1930 to the present. Chapter 5 then proposes a new way of thinking about an enemy's most important targets. The national elements of value dynamic targeting model takes into account the compensating interaction of any country's key sources of strength and suggests a fresh way of looking at country targeting. Finally, chapter 6 draws together the salient features of strategic paralysis and its key ingredients, and suggests the limitations and benefits of this strategy.

Strategic paralysis is an airpower scheme of attacking or threatening selectively those strategic or national-level targets that most directly support the enemy's war-making efforts and will to continue his current behavior. Strategic paralysis warfare should result in a change in the enemy's behavior at a lesser cost to both sides because of the weapons used and the targets selected. Airpower is the primary weapon because only it can provide the near simultaneous shocks to the enemy's central nervous system that are necessary to induce paralysis. Strategic paralysis holds the promise of so stunning an enemy that he has no choice except surrender or risk further societal devastation. Given the growing concern for cost and casualties, strategic paralysis makes sense. It may not work in every case, but its vast potential for success cries out for further consideration.

Overview

The rest of this introductory chapter provides the tone and tint of the paper by way of a comprehensive overview of the key tenets of strategic paralysis.

Right Targets

If "airpower is targeting," as some theorists contend, then the selection of those targets is the key to unlocking the full potential of what airpower can bring to any conflict. Strategic paralysis rests upon a basic premise, supported by years of experience and common sense. Not all targets are of equal value. Since airpower is usually limited and precious,[5] it makes good sense to concentrate it on those targets that will result in the largest enemy effect. These key targets, or national elements of value, represent a cross-section of the enemy's sources of strength. If the right combination of these elements can be neutralized, paralysis on a strategic scale will occur.[6]

A country's NEVs are located in its leadership, communications, industry, population, military, alliances, and transportation systems. Four key assumptions are made. The first is that NEVs vary in importance from country to

country. While every country draws strength from the same elements, it is unlikely that any two country's elements will ever be the same. Take, for example, North Korea and the United States. Both draw strength from the same list of elements, yet the elements are certainly not of identical importance.[7]

The second assumption is that interaction between NEVs is self-compensating. In other words, a decrease in the strength of one element (as might be caused by an air attack) will likely be offset by other elements.[8] This debunks the notion that there is much inherent value in single target (center of gravity) targeting as a means to bring down an entire country. It leads us to the inevitable conclusion that only simultaneous attacks across several elements (or the sudden and catastrophic loss of a single NEV) are likely to bring about the desired change in the enemy's behavior. Would the Iraqis have surrendered in the first hour of Desert Storm if *all* of their communications capability or *all* of their transportation assets had been destroyed? Even if such destruction were possible, and it was not, it is likely that other avenues would have been found to make up for these losses.[9]

A third assumption is that the enemy government is rational. There can be no accounting for an enemy that is willing to sacrifice everything for his cause, and there are causes for which an enemy may be willing to go this far.[10] It follows, then, that strategic paralysis is probably not well suited for territorial acquisition, since it is unlikely that a country will easily submit to occupation of its territory even if it is essentially occupied from the air already. However, strategic paralysis should work well in convincing an enemy to cease its territorial aggression or to give up territory it has already seized.

Strategic paralysis postulates that once paralysis is induced, the enemy will have no choice but to surrender in the face of mounting destruction. Compare this to a drunk who charges onto your property while yelling obscenities at your wife. Two quick shots to his knee caps and he collapses. Unable to continue the physical attack, but still able to curse you, he lies defenseless (but still on the property) before you. Realizing his position, the burden of the next move rests with the drunk as he now must consider his options. So far, he has only sustained "minor" damage and should be motivated to crawl away quietly. However, it is conceivable that he might continue to yell at you (remember he is drunk) and swing his arms while dragging himself slowly toward you. (Of course, you are assisting by trying to talk some sense into him and explaining what will happen if he proceeds.) You are in a position either to avoid him until he sobers up and begins to appreciate his real predicament (i.e., the pain, and the loss he has suffered already) or to continue to apply force to get him to change his behavior altogether. Force can be incrementally applied (shooting into his arms, feet, eyes, or ears) until the desired concessions are made.[11] It is assumed under strategic paralysis that rational leaders, realizing their predicament, will stop somewhere short of the drunk.

The final assumption in selecting the right targets (NEVs) is that the necessary intelligence to carry out the campaign is available. Strategic

paralysis requires timely intelligence on a scale and at a depth never before required. It is no longer of interest to know merely which town to attack, but what building and what office. If an enemy's leadership element is to be attacked, information on whom to hit and whom to spare will be necessary. If communications are to be hit, what are the key nodes? If industry, where in individual factories do the bombs need to be placed? The purpose here is to paralyze, not obliterate. Liddell Hart remarked some years ago, and history supports, that excessive destruction of an enemy comes back as a burden on the very societies that caused it.[12]

Technology

More than land or sea forces (except, perhaps, for submarines), airpower is necessarily reliant upon technology for its very existence. With strategic paralysis, this relationship is pushed to the limit. Stealth, precision guided munitions (PGM), cruise missiles, deep-penetrating bombs, and global positioning satellites enable us to accomplish things never before attainable. Bridges that in World War II seemed immune to anything less than 40,000 pounds of bombs, now drop under the influence of a single well-placed weapon.[13] Huge increases in accuracy and lethality give us the capability to selectively paralyze an enemy's NEVs with an absolute minimum number of civilian casualties. Minimizing damage and civilian losses are key tenets in this theory. The goal is a change in the enemy's behavior. It may become more difficult to induce this change as costs in damages and deaths rise. Therefore, the enticement to behavioral change rests in the weight of his accumulated damage and in the threat of future destruction. This approach also appeals to the society's economics and mores.

Vulnerable Infrastructure

Alexander de Seversky once noted that airpower was most effective on those societies that were the most advanced industrially. De Seversky realized that for airpower to be effective, it had to be able to hit meaningful targets. It seems logical that for strategic paralysis to be successful, it has to be employed against an enemy dependent upon a well-developed, modern, and vulnerable infrastructure. Third world countries devoid of large transportation hubs, bridges, important production facilities, and modern communication networks are less likely to be influenced by attacks from the air than countries having such features. Airpower cannot attack what is not there; likewise, it cannot attack what it cannot find. Troops moving along a jungle trail are less vulnerable than a suspension bridge. Modern infrastructures are very expensive, even more so if they are designed without vulnerabilities (i.e., hidden, buried, or camouflaged). Strategic paralysis assumes that attacks on these highly prized elements will not only shock and stun the enemy but will inflict great pain, a powerful incentive for behavioral change.

Aerospace Control

The final ingredient necessary for the theory is control of the skies over the enemy. This access (or, more properly, the gaining and maintaining of air superiority) is critical to the successful completion of most military campaigns and is absolutely vital to a strategy of strategic paralysis. If the enemy's most vital elements are to be selectively attacked, then freedom to strike at will over his territory is needed. This control of aerospace does not have to be a continuous feature. Limited control should suffice. Air Force Manual (AFM) 1-1, *Basic Aerospace Doctrine of the United States Air Force,* defines aerospace control as: "The role that encompasses all actions taken to secure and control the aerospace environment and to deny the use of that environment to the enemy."[14] This is not exactly air superiority in the traditional sense.[15] Stealth technology carries with it its own brand of traveling air superiority—an aerospace cocoon, if you will. In fact, as long as the necessary targets can be attacked while holding the rest at risk, the enemy could, from time to time, still control portions of the sky above his country without its having a negative impact on the overall campaign. Interestingly enough, the focus of the initial attack need not be on the enemy's military or even his air forces. If "enough" aerospace control can be achieved to strategically paralyze the enemy as a whole, then his military is rendered impotent as well. Unless the goal is simple punishment (or future denial), sorties to destroy a military that cannot strike back may be wasted effort. Remember the analogy of the drunk attacker; the goal was to first stop him in his tracks with the minimum effort required so that he no longer was a threat, and then to apply whatever pressure was necessary to achieve the concessions desired. Simply killing him (as one might have done) was not a consideration because of concern for minimizing the total costs, both to the drunk and to ourselves (bullets can be expensive, too), along with a high regard for human life and a healthy respect for "world" opinion.

Summary

This chapter has provided an overview of strategic paralysis and, hence, an outline of this paper. This subject is of considerable practical importance as the US defense budget gets smaller. Therefore, where examples are lacking or historical evidence is scant, it is hoped that this study will become the skeleton upon which a full and factual theory may be cumulatively built.

Strategic paralysis is specifically designed to force a change in an enemy's behavior through the use of airpower. Four key ingredients or conditions appear necessary for its success. The right targets (intelligence) have to be attacked with the right weapons (technology) and the enemy must, for the most part, be dependent upon a well-developed, modern, and vulnerable infrastructure. Finally, command of the air must be achieved. The next chapter explores this strategy in detail.

Notes

1. Little, in actuality, is really new about either the concept or the name I propose. What is new is that airpower's capability to paralyze an enemy has finally come to fruition. I hope to be able to take the various theoretical threads of this idea, scattered as they are over the last 80 years, and weave them into a coherent and viable strategy. Liddell Hart and Billy Mitchell both talked about airpower's ability to paralyze the enemy years ago, and Col John Warden has recently used the words *strategic paralysis* in almost the same vein. As just one example (of many) where airpower is associated with inducing some sort of paralysis, before World War II British Air Commodore Charlton advocated dropping bombs on the enemy's capital stating: "It is the brain, and therefore the vital point. Injury to the brain means instant death, or paralysis, whereas injury to the body or the members, especially if it be a flesh wound, may mean nothing at all, or, at most, a grave inconvenience." (Emphasis added.) Air Commodore L. E. O. Charlton, *War From the Air* (New York: Thomas Nelson and Sons, Ltd., 1935), 151.

2. This is a rather tidy summation of the ways governmental change can come about; there are some other more subtle ways, such as pressure from alliances, or neighboring countries; a democratic change in leadership through the elective process, or negotiation methods (bribes) that entice the enemy to quit.

3. This is not to say that airpower, as a whole, is excluded from meaningful participation in low intensity conflict situations where vulnerable infrastructures do not exist. On the contrary, airpower offers solutions along the full spectrum of conflict. A legitimate question would concern the role of airpower in a large-scale, conventional conflict against a third world nation with a minimal infrastructure, such as in Vietnam. This paper merely focuses on the application of airpower in its theoretically most significant role.

4. Most people call this free reign or access of the sky, air superiority or air supremacy, but it is really something more. Our airpower must have freedom over the enemy if it is to successfully employ this strategy. This access can be forcibly achieved by shear firepower or overwhelming force, or it can be inherent in the weapon system that is used. For example, a stealth aircraft brings its own type of air superiority with it to the fight and does not require the traditional fight for access usually associated with the gaining and maintaining of air superiority.

5. The nature of modern aerospace power makes it very expensive, hard to replace, and subject to a multitude of abuses by those who don't understand it. It must be conserved by caring and competent airman. Airpower has been likened to a thunderbolt launched from an eggshell that is tied to an air base. See AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force,* March 1992, 16; for an airman's perspective of the preciousness of airpower as it relates to the "Economy of Force" principle of war.

6. Clausewitz called these elements "centers of gravity" and Giulio Douhet called them "vital centers," but their concepts are similar.

7. It might be possible to find a country that is so lacking in a certain element that the element is virtually nonexistent. The military in Japan after World War II, or any key industry in North Vietnam during the Vietnam War, might serve as examples.

8. This was the basic premise of Mancur Olson (discussed in more detail in chapter 5) who, in his book, *Economics of Wartime Shortages,* contends that modern societies are less susceptible to all types of shortages than previously thought. In a broader sense, this extends through all NEVs. Take, for example, the industrial element in Germany during World War II. It was thought that the ball bearing industry was the key to Germany's war production; i.e., knock it out and they will be unable to continue the war. Much of Germany's ball bearing industry was destroyed, but this did not impact them as expected. The Germans compensated by importing ball bearings from Sweden, dispersing their production facilities, and bringing together any stockpiles that remained. See General der Flieger a.D. Paul Deichmann, "The System of Target Selection Applied by the German Air Force in World War II," USAF Historical Studies No. 186, 1956, 30.

9. This is not to suggest that a Clausewitzian center of gravity will never be found in some cases. Many, such as Colonel John Warden, argue that leadership is such a target. Saddam may have been a center of gravity for Iraq, but was President Bush? The answer, of course,

varies with the form of government and would have to be assessed on a case-by-case basis. In his study of Germany's system of target selection, Deichmann concluded: "In examining objects in Germany to determine their need for defense, it had been found that there were individual targets of such a nature that their destruction could influence the outcome of an entire war. One such target was the person of Hitler as the most important factor supporting the will to conduct war." Deichmann, 30.

10. Conflicts where homeland, way of life, or wars over religious beliefs are examples.

11. A cautious word here about gradualism and the incremental use of airpower. I am well aware of the stigma associated with both of these terms, courtesy of our Vietnam experience. However, this should not be understood as a gradualistic approach ala Thomas C. Schelling; negotiations do not occur in strategic paralysis until paralysis has been achieved (as in the case of our drunk attacker). Strategic paralysis, then, starts off quickly and ferociously; however, once the enemy can no longer harm us and his offensive action has been stopped, it is logical to give him some room to acquiesce. I realize it is unlikely there will be an identifiable dividing line in this process. A determination as to how and when the shooting stops rests in the hands of the politicians and senior military commanders. The point is to limit further damage and civilian casualties unless the enemy is belligerent. This is not to say that there will not be times when simple punishment is in order. As a matter of fact, it may be in our best interests to selectively destroy some threatening aspects of an enemy's future capability while we are at it, even if those elements were not a part of the equation in the current conflict (e.g., Iraq's nuclear capability in Desert Storm). See Thomas C. Schelling, *The Strategy of Conflict* (Massachusetts: Harvard University, 1980).

12. "If one lesson stands out clearly from the history of modern wars, it is that the commerce and prosperity of civilized nations are so closely interwoven and interdependent that the destruction of the enemy's economic wealth recoils on the head of the victor." Sir Basil Henry Liddell Hart, *Thoughts on War* (London: Faber and Faber Ltd., 1944), 42. This is covered in greater detail in chapter 4.

13. Explosive power *and* accuracy are the real issues. World War II proved that 500-pound bombs were not very effective against steel bridges and that "well-placed bombs" were few and far between. For example, on night bombing raids in 1941 (before the area bombing directive by the Air Ministry was issued), the British discovered that only one in five crews dropped their bombs within five miles of the target; this improved to two in five on a fully moonlit night but was only one in 15 during a new moon. See "Report by Mr. Butt to Bomber Command on his Examination of Night Photographs, 18 August 1941" in Sir Charles Webster and Noble Frankland, *History of the Second World War, United Kingdom Military Series,* vol. iv, *The Strategic Air Offensive Against Germany, 1939–1945* (London: Her Majesty's Stationery Office, 1961), 205; see also, Martin Middlebrook and Chris Everitt, *The Bomber Command War Diaries, 1939–1945* (New York: Penguin Books, 1990).

14. AFM 1-1, *Basic Aerospace Doctrine of the United States Air Force,* vol. 2, March 1992, 269.

15. AFM 1-1 defines *Air Superiority* as does DOD Joint Pub 1-02, as: "That degree of dominance in the air battle of one force over another which permits the conduct of operations by the former and its related land, sea, and air forces at a given time and place without prohibitive interference by the opposing force; *Air Supremacy* is further defined as: "That degree of air superiority wherein the opposing air force is incapable of effective interference," AFM 1-1, vol. 2, 273.

Chapter 2

The Theory of Strategic Paralysis

When we have incurred the risk of battle, we should know [beforehand] how to profit by the victory, and not merely content ourselves, according to custom, with possession of the field.

— Maurice de Saxe, 1732

This chapter sets forth a theory for applying airpower to affect a change in an enemy's behavior. A framework for conducting an air war, utilizing modern technology against an enemy's most vital targets, is defined and compared with the more traditional strategies of warfare. Though not suited for all types of conflicts, and beholden to four distinct prerequisites, strategic paralysis is presented as a complementary strategy of great potential.

A Strategy of Strategic Paralysis

The idea of paralyzing the enemy is not new. There are many historical references to this concept of paralyzing a foe.[1] In the 1950s, Basil H. Liddell Hart foresaw the importance of "paralyzing" an enemy by air so as to win wars at the lowest possible cost: "It is thus more potent as well as more economical to disarm the enemy than to attempt his destruction by hard fighting. . . . A strategist should think in terms of paralysis, not killing." Liddell Hart argued that "a man killed is merely one man less, whereas a man unnerved is a highly infectious carrier of fear capable of spreading an epidemic of panic." This fear can spread to the higher levels of command as well, even to the mind of the enemy commander, nullifying "the whole fighting power that his troops possess." At even a higher level, Liddell Hart argued that the resulting "psychological pressure on the government of a country may suffice to cancel all the resources at its command—so that the sword drops from a paralyzed hand." Liddell Hart's analysis of war showed "that while the nominal strength of a country is represented by its numbers and resources, this muscular development is dependent on the state of its internal organs and nerve system—upon its stability of control, morale, and supply."[2]

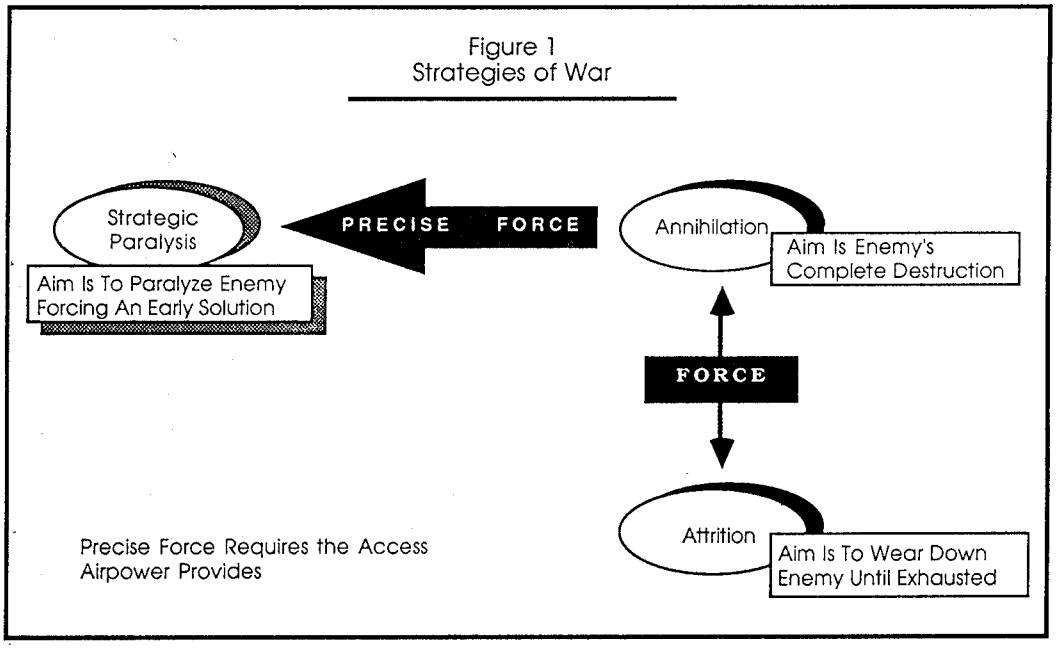
Liddell Hart's ideas are significant in their recognition of a stratification of increasingly important levels within any government. He implies that strikes at the higher levels have the most impact; and that if targets are selected carefully, a form of national or strategic paralysis can be induced.

Strategic paralysis through air warfare is intriguing because it promises a solution to the conflict at some level of destruction short of complete annihilation.[3] It is also appealing because fewer people and supplies are at risk, the timing and the tempo of the attacks can be controlled and, most importantly, the very nature of the targets chosen should ensure a quicker, less costly victory.[4]

The US strategic bombing campaigns conducted against Germany and Japan in World War II were attempts at strategic paralysis. World War II planners wanted to "paralyze" the axis powers through a dedicated bombing campaign against their vital centers. Unfortunately, the effort and the available technology were not up to the task. Strategic paralysis, then, as a concept is quite old, but as an actual strategy is quite new. Airpower advocates have long dreamed of the capability to win wars with airpower. Not until today has technology caught up to airpower theory, giving us the capability to make old dreams reality.

Figure 1 depicts strategic paralysis in relation to the more traditional strategies of war.[5] Annihilation and attrition strategies are linked by what can be simply labeled a change in force. In other words, some increase in military capability vis-a-vis an opponent will always be associated with the ability to annihilate the enemy versus simply wearing him down. Strategic paralysis, on the other hand, is a uniquely different strategy, being neither solely annihilative nor attritive. It, too, is enabled by a change in force or capability, but the difference is in quality and not quantity. That is, strategic paralysis requires the capability to selectively attack an enemy at will and with a precision that ensures fewer casualties.

Figure 1
Strategies of War



Traditional Strategies of War

Most military historians recognize two fundamental strategies of warfare: attrition and annihilation. As illustrated in figure 1, attrition warfare seeks an eventual victory by exhausting the enemy in time, space, energy, and supplies. The problem with this strategy is in accurately predicting who will wear out first. From the perspective of military history, which values a quick, decisive victory in battle, attrition warfare stands out as an unappealing choice for a war strategy. Be that as it may, it has its uses.

The addition of more force or war-fighting capability allows for a strategy of annihilation. This is the strategy of choice, because it implies superiority over one's adversary. Here, one seeks the complete and utter destruction of the enemy.[6] But this form of war is often costly and indiscriminate. A third and complementary strategy is made possible by airpower—strategic paralysis.[7] Strategic paralysis, lying somewhere beyond both traditional strategies, aims at an earlier and less costly solution by paralyzing the enemy's key sources of strength.

Attrition

Attrition warfare generally occurs between forces of roughly equal capability. By its very nature, attritive strategy usually leads to warfare of greater duration and cost in both lives and treasure. This type of warfare occurs most often between forces of nearly equal size when neither adversary can outthink his opponent (get within the other's decision cycle) nor exploit whatever success might come his way. Solutions to this type of warfare through World War I were usually achieved by maneuver, initiative, and effrontery. Probably no truer practitioner of this strategy can be found than the German General Erich von Falkenhayn. Falkenhayn, as chief of the General Staff in World War I, seems to have deliberately chosen a strategy of exhaustion in the trenches of World War I so as to, in his words, "bleed to death" the forces of France.[8] Yet, surely even Falkenhayn would have gladly abandoned attritive warfare had he only been able to break the stalemate and had he the strength, strategy, or supplies to exploit it.

Annihilation

Annihilative warfare is generally pursued through a strategy of overwhelming force. Indeed, it makes little sense to try to annihilate a superior foe. The strategy used by Gen U. S. Grant in his pursuit of Gen Robert E. Lee during the American Civil War is often thought of as annihilative warfare. Historian Russell F. Weigley has written: "Grant became the prophet of a strategy of annihilation in a new dimension, seeking the literal destruction of the enemy's armies as the means to victory."[9]

Looking back at their situations, we can see that Grant and Falkenhayn had few choices in the strategy they could pursue, short of compromise.

strategy that advocated the daylight precision bombing of Germany's industrialized centers as a way to force (paralyze) them into ending the war. What prevented us from being successful?[14] It would seem that the airplanes, bombs, and navigational instruments—that is, technology—were not up to the task.[15] "Dropping bombs from aloft appears to be a very simple operation, but as a matter of fact it is an extremely difficult matter to strike the target especially from high altitudes."[16] Indeed, targets had to be attacked heavily and often because accuracy and ordnance were so poor. For example, according to the World War II United States Strategic Bombing Survey, B-17 accuracy over Europe could achieve no better than a 1,200-foot circular error of probability (CEP) from 22,000 feet. Looked at another way, it took 100 bombers to completely destroy a single 1,000-foot radius circle. This may be why in AWPD-1, 6,860 bombers were called for to destroy only 154 targets. The situation was no better for the B-29 in the Pacific, where it was estimated that "only 50 percent of [the] total aircraft dispatched would successfully attack a given target and that only 25 percent of the bombs dropped (or 12 percent of the total lift of bombs dispatched) would fall within a 1,000-foot radius of the aiming point."[17] As has been said about conflict: "You can fire small-caliber rifle bullets indiscriminately into an elephant all day and he will still be on his feet at night. One aimed shot, however, will knock him to his knees."[18]

The Strategic Paralysis Concept

In strategic paralysis, airpower is employed to accurately strike at an enemy's national elements of value (NEVs are discussed in detail in chapter 5) so as to paralyze his ability to continue the conflict and perhaps even break his will to do so. The desired result is a change in the enemy's behavior. Since aerospace control has already been achieved, all efforts can be directed at this aim, either by paralyzing the enemy or holding the rest of his critical targets at risk. This strategy is naturally attractive because it holds out the promise of a decisive victory from the air at far less cost and in a shorter time span than either attrition or annihilation.[19] Of course, if a belligerent nation refuses to yield, a policy of systematic annihilation can still take place and little would be lost. Strategic paralysis seems to conform to the way America likes to fight her wars: quickly, inexpensively, and with as little bloodshed (on both sides) as possible. High-tech airpower is what makes a strategy of strategic paralysis possible.

A Vulnerable Infrastructure

Another key assumption in applying a strategy of strategic paralysis successfully is a suitably vulnerable country. Since the goal of strategic paralysis is quick victory and the means of achieving it is technologically superior

airpower, the strategy requires important and vulnerable targets if it is to succeed. This readily assumes a modern industrialized society that is reliant on a fixed and vulnerable infrastructure. Iraq serves as a good example. Its bridges, communication centers, power production stations, and water plants were extremely vulnerable to air attack, thus presenting a nearly ideal target for a strategic paralysis campaign. Desert Storm, in fact, was the closest approximation to a strategic paralysis strategy in any air campaign ever conducted.

Slides from Strategic Paralysis

Of further interest in the review of figure 2 are the effects that a loss of technology (or capability) can have on the implementation of this strategy.[20] Two paths are possible—a move over to annihilation or a precarious drop down to a war of attrition. Let us consider each separately. The first and less serious condition is a "loss" of technology that forces one back into a less discriminating war of annihilation. In this instance aerospace control is not lost, but the ability to precisely attack at will is lost. This could occur if, for instance, the enemy were able to devise some sort of countermeasure for precision-guided (smart) munitions or cruise missiles—say, for example, a chain link fence or the ability to effectively jam GPS.[21] As the capability to deliver weapons accurately returns, the resumption of a paralysis operation may also return.

The second situation, a drop from strategic paralysis to attrition, is of much more concern. It might occur in instances where an enemy's leap in technology or force becomes great enough to deny aerospace control (notice the one-way arrow in figure 2). This occurs when aerospace control, technology, or some combination is lost. The loss of technology associated with a drop to attrition is a more serious situation because aerospace control is also forfeited. An effective stealth detection (and missile system) employed against a stealth attacker might be such a situation. Because the net effect of this technology loss is a loss in aerospace control, the attacker is forced to regain the skies (work through the attrition stage) before he can continue with either an annihilation or strategic paralysis strategy. Such is the danger of putting all your money into any one technology. You stand to lose a great deal if it is successfully countered.

Even if the loss of aerospace control occurs through nontechnical means, the result is the same. Such a situation might occur if the enemy were suddenly able to overwhelm your air forces through acquisitions from alliances or strategic reserves.

A drop from strategic paralysis can also be self-inflicted. The mismanagement of precision weapons, the failure to materially (or logistically) maintain air superiority, or a decision not to exploit advantages because of political considerations (as in Vietnam) all have the same effect.

Strategy Selection

While attrition is an unpopular strategy forced upon or inherited by its user, such is not the case with annihilation and strategic paralysis. There clearly is a choice. The difference lies in intent. Since both operate with aerospace control, both can target anything they please. Even though technology enables strategic paralysis to strike in a surgical fashion, the enemy could still be annihilated with smart weapons if it were not for the goal of a less costly conflict. I am suggesting that annihilative warfare fought with dumb weapons is generally more expensive than strategic paralysis, depending on the duration of the conflict, its scale, and the price each side places on human life. It seems logical, then, that strategic paralysis has the potential to resolve conflict at a lower cost because of its unique methodology and target selection.[22]

Strategic Paralysis and Territorial Acquisition

Because war is a test of national will, it is entirely possible that an opponent may not capitulate until all of his armed forces are destroyed and his country occupied.[23] On the other hand, it is unlikely that countries will risk complete destruction in a dispute short of national survival. It follows, then, that strategic paralysis is probably not well suited for territorial acquisition, since it is unlikely that a country will easily submit to occupation of its territory even if it is essentially occupied from the air already. However, strategic paralysis should work well in convincing an enemy to cease his own territorial aggression. This is where the strategy holds promise—in its ability to persuade an opponent to give up his position before a costlier form of warfare is necessary.

This is not to suggest that strategic paralysis can *never* be used for territorial expansion. The methods would be the same, but occupying forces would probably be needed at some point. "Probably" because even though airpower alone has never before succeeded in territorial conquest, that is not proof that it can never be done.[24] Who's to say that the strategic bombing of Germany might not have succeeded on its own had its effort not been diluted, or that the Desert Storm air campaign might not have forced Iraq out of Kuwait if given another day, week, or month?[25] Col John Warden may have wondered the same thing when he stated: "The loss of air superiority put Iraq completely under the power of the Coalition; what would be destroyed and what would survive was up to the Coalition and Iraq could do nothing. It lay defenseless *as if occupied* by a million men. For practical purposes, it had become a state occupied—from the air."[26] (Emphasis added.) Although from another era, de Seversky put it this way.

> The fact that the Germans failed to knock out England from the air decidedly does not mean that knockouts from the air are impossible. It means only that Germany was not properly prepared to do it. One might as reasonably argue that because some armies have failed to do so, armies in general cannot score a decision. In claiming that airpower can, under certain circumstance, win a battle or a war, we

necessarily assume that the appropriate strategy, tactics, and weapons for that purpose are available.[27]

This discussion inevitably leads to the argument that aviation cannot hold ground, and that victory results only when enemy territory is physically occupied. Toward this we can only say that more evidence is needed. Douhet, however, needed no further proof. For him, physical occupation was not an essential. "A nation may be conquered by hunger. When a fortified town surrenders because it no longer has food, its occupation is a result—not a cause." World War I, after all, was almost lost because of submarines that possessed no occupying power themselves. The war "was lost by a nation with armed forces intact, possessing large areas of enemy territory and with none of its own soil occupied by the victors."[28]

Strategic Paralysis for Offense and Defense

Is a strategy of strategic paralysis more suited for offensive or defensive action? Because of the requirement for aerospace control, strategic paralysis is a strategy that is clearly more relevant to offensive engagements. One cannot imagine an attacker who would knowingly either allow his opponent to retain an aerospace control capability or who would attack at all knowing his aerospace capability to be inferior. For example, anyone who attacks the United States without first solving the aerospace control problem faces certain defeat, even if in the possession of superior land and sea forces. On the other hand, it might be conceivable that the United States' reaction to such an attack (in a defensive sense) would take on the character of a strategic paralysis response. Even though the return attack would invariably correspond to the magnitude of the attack on us, it still seems likely that the US would rather carefully measure its response commensurate with the damage received. Strategic paralysis, then, is more suited for the offense, being a strategy of action and initiative.

Achieving Results

War Aims and End States

Maurice de Saxe, in *Mes Reveries,* noted: "When we have incurred the risk of battle, we should know [beforehand] how to profit by the victory and not merely content ourselves, according to custom, with possession of the field."[29] This introduces the idea of *end states,* the condition we want to exist at the end of the conflict.[30] Do we seek real estate, peace, mineral rights, or the enemy backing down? If war is a contest of wills, as indeed it is, then the ultimate end state desired should be the enemy's submission to *our* will. Officers at the Air Corps Tactical School (ACTS) put it this way.

> The *aim* in war is to force an unwilling enemy government to accept peace on terms which favor our policies. Since the actions of that hostile government are based upon the will of the people, no victory can be complete until that will can be molded to our purpose. The ultimate aim of *all* armed forces is to break down the enemy's will to resist.[31] (Emphasis in original.)

In other words, before we levy destruction on the enemy, we should have some idea as to what state of affairs we want to be left with after the battle. For instance, if in a battle of annihilation an enemy was so completely devastated that afterward massive transfusions of foreign aide were required, it might make the end not worth the means.

Interestingly, Liddell Hart placed great emphasis on visualizing the outcome of war, describing the great care that should go into the proper selection of targets, not so much for their impact in ending the war, but for their impact on the peace that would follow: "If one lesson stands out clearly from the history of modern wars, it is that the commerce and prosperity of civilized nations are so closely interwoven and interdependent that the destruction of the enemy's economic wealth recoils on the head of the victory." Liddell Hart felt for reasons of self-interest as well as human benevolence that warring nations should endeavor to gain their end while inflicting a minimum level of permanent injury to both life and industry. "For the enemy of to-day [sic] is the customer of the morrow, and often the ally of the future. To inflict widespread and excessive destruction is to damage one's own future prosperity, and, by sowing the seeds of revenge, to jeopardize one's future security."[32] This is a hauntingly descriptive and accurate assessment of most of America's military history.

The ACTS also wrestled with the notion of end states, admitting that the "particular conditions essential for a prosperous peace may require three general types of action" in war: physical acquisition, political acquiescence, or physical and political defense.[33] The point is that new airplanes and new technologies have not decreased by one iota the importance of clearly and carefully defining the political objectives before the fighting starts.

Methodology and Mechanisms

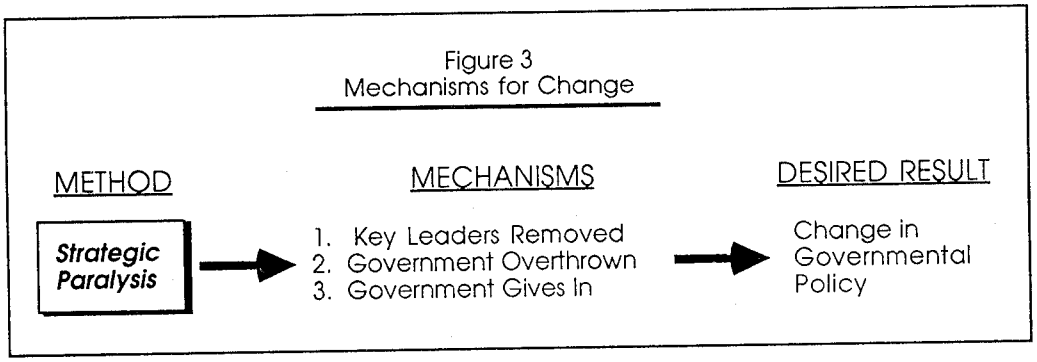
Why should strategic paralysis work? To answer this question, we must briefly explore the relationship between airpower and coercion. Can a force from the air alone coerce an enemy to change his behavior?[34] On this question there is great disagreement. However, most military theorists do agree that the end of any conflict is usually and necessarily accompanied by a change in the enemy government's behavior. This is logical, for without some sort of change there could be no method for war termination. Of interest here, however, is the mechanism for inducing or coercing this change in the government's position. It is generally thought to occur in at least three ways. First, key governmental leaders can be killed and/or replaced by a more sympathetic group. Second, the government can be overthrown, either by popular revolt or from a faction within. Third, the leaders in charge can change their

minds and stop what it is they are doing. The debate occurs in trying to determine how this change is achieved, and more specifically the role airpower plays in it. Figure 3 visually depicts this process.

The goal of strategic paralysis is to selectively neutralize or hold at risk the enemy's most important targets; that is, those most critical to his ability or will to continue his current behavior. Therefore, the desired outcome (i.e., his changing his mind) can result from any of three mechanisms, depending on the targets selected.

Figure 3 reveals some interesting applications of strategic paralysis. Depending on the circumstances and the end state desired, a strategic paralysis campaign could be specifically aimed toward achieving one of the three mechanisms (or combination thereof) needed to persuade an enemy to change his mind. If certain governmental leaders are barriers to achieving the end results, then they could be specifically identified with an eye toward replacing them with potential successors more agreeable to the desired result. If, on the other hand, it is thought that no change could occur until the government is replaced (by an angry populace or a competing party), targets could be selected that favor enhancing the discontent of the population, rival governmental parties, or alliance partners. This outcome is more difficult to achieve for it requires attacking targets that increase the peoples' discomfort and their skepticism concerning their government's ability to protect them.[35] The last mechanism, one where the government chooses to change its policy while still intact, is more complex. Yet, it is appealing. Presumably, this change occurs in governments that are able to rationally assess their situation and choose to back down rather than suffer further losses. Strategic paralysis should be particularly effective in these situations, for if executed properly and under the right conditions, it leaves the enemy with two choices: give in (i.e., surrender for terms) or risk further destruction.[36]

Figure 3
Mechanisms for Change



Summary

This chapter has described the theory and conditions behind a strategy of strategic paralysis and its relation to the more traditional strategies of annihilation or attrition. To help visualize this relationship, figure 2 presented

an airpower framework for understanding these strategies of war. It was noted that, among air powers, aerospace control is a necessary ingredient for a country to annihilate an enemy. Once control of the air is achieved, a country may move to a strategy of strategic paralysis if its technology permits.

Strategic paralysis promises many advantages over the other two forms of war—namely, a quicker victory at a far lower cost. These benefits, however, do not come without cost. A successful strategy of strategic paralysis requires four ingredients: (1) the capability (intelligence) to select the proper targets; (2) the technology to reach them accurately and with impunity; (3) aerospace control; and (4) an enemy dependent upon a well-developed, modern, and vulnerable infrastructure. The next several chapters look at the history and theory of airpower targeting and begin laying the foundation for the presentation of the national elements of value model.

Notes

1. Mitchell, Douhet, the Air Corps Tactical School, the Luftwaffe, Lords Hamely and Montague, and Liddell Hart (along with many others) all make explicit reference to the idea of airpower's ability to paralyze an enemy. More recently, Secretary of the Air Force Donald B. Rice, in a speech to the Air Force Association symposium on 25 October 1991, specified that one of the necessary core capabilities of the Air Force was the "ability to paralyze our adversaries' war-fighting ability as airpower did in Operation Desert Storm." See Julie Bird, "Rice: New Capabilities Are Needed," *Air Force Times,* 11 November 1991, 6.

2. Sir Basil H. Liddell Hart, *Strategy* (London: Faber & Faber Ltd., 1954; reprint, New York: Penguin Books, 1991), 212 (page references are to reprint edition).

3. Credit for reviving this expression goes to Col John A. Warden III, whose ideas are discussed in chapters 3 and 4; John A. Warden III, "Employing Air Power in the Twenty-first Century," 1991 TMs [photocopy] draft manuscript, 1.

4. To be sure, strategic paralysis has its opponents. For example, Lt Gen Sir Edmund Ironside in *Land Warfare—A Study of War* states: "Personally I cannot see two nations each assailing the other's economic resources by air attack and seeking by species of reduction of morale, by intimidation and attrition generally, to bring the enemy to his knees: could there be a more farcical battle of Kilkenny cats?" (Emphasis in original.) As quoted in Auspex, *Victory From the Air* (London: Whitefriars Press Ltd., 1941), 8; see also a statement by Admiral Richmond (from *Sea Power in the Modern World,* 1934, 103–4) saying in part: "If it is a fact that wars in the future will be decided by direct attacks upon the civil population; and if it be also true that the fundamental principle of the strategy of war in the air is not, as it is on land and at sea, to overcome the armed forces of the opponent, then it would follow that warfare will consist of an intensive process of cross-raiding between the opponents." Admiral Richmond then proceeds to show by historical example that action of this kind is not calculated to lead to a decision. As quoted in Auspex, 9.

5. The author is indebted to Maj Nick Clemens and Lt Col Phil Meilinger, both with the School of Advanced Airpower Studies, Maxwell AFB, Alabama, for helping distill and nurture these ideas. It was Major Clemens' idea to search for a suitable framework in which to present all three strategies.

6. Russell F. Weigley argues: "In the history of American strategy, the direction taken by the American conception of war made most American strategists, through most of the time span of American history, strategists of annihilation." Russell F. Weigley, *The American Way of War* (Illinois: Indiana University Press, 1977), xxii. For another example, see Weigley, *The Age of Battles* (Indiana: Indiana University Press, 1991), 537–38. "The Napoleonic victories of

Austerlitz and Jena-Auerstadt are regarded as the classic fulfillments of a strategy of annihilation through decisive battle."

7. As one example, see: Jehuda L. Wallach, *The Dogma of the Battle of Annihilation* (London: Greenwood Press, 1986), 177. Wallach credits the German historian Hans Delbruck with introducing the term "attrition strategy" and describes attrition as opposite of annihilation. See also Hans Delbruck, "On the Contrast Between the Strategies of Attrition and Annihilation," in *History of the Art of War,* vol. IV; *The Dawn of Modern Warfare,* trans. by W. J. Renfroe, Jr. (Nebraska: University of Nebraska Press, 1985), 439–44; 108–9. See also Carl von Clausewitz, *On War,* ed. Michael Howard and Peter Paret (New Jersey: Princeton University Press, 1976), 384, where Clausewitz recognizes these two strategies: "Two decisions and therefore two kinds of reaction are possible on the defending side depending on whether the attacker is to *perish by the sword or by his own exertions.*" (Emphasis in original.) Wallach, however, contends that in Clausewitz's theories, attrition and annihilation comprise only two components on a vast scale. Wallach, 178.

8. Alistair Horne, *The Price of Glory: Verdun 1916* (London: Penguin Books, 1964), 44–45. Horne goes on to say of Falkenhayn's memorandum (from which the passage is taken) that: "Never through the ages had any great commander or strategists proposed to vanquish an enemy by gradually bleeding him to death." See also Wallach, 176–79.

9. Weigley, *American Way of War,* 145. See also, David Donald, ed., *Why the North Won the Civil War* (New York: Collier Books, 1962), second essay, "The Military Leadership of North and South," by T. Harry Williams, 50–54.

10. Horne, 44.

11. I am not suggesting that wars of annihilation are impossible without airpower, just very difficult. Between nations with large modern air forces, annihilative wars require aerospace control. This is not to say that, once aerospace control is achieved, annihilation of the enemy cannot occur by land or sea forces.

12. One need only examine the various DOD Joint Publications, such as 1-02, for the definition of air superiority (already presented in chapter 1, endnote number 14) to see this. See also, Joint Pub 1, *Joint Warfare of the US Armed Forces,* November 1991, and Joint Pub 3-01-2, *Joint Doctrine for Theater Conventional Operations.*

13. Admittedly, wars of attrition can be countervalue, but it is hard to imagine true countervalue targeting before the armed forces of that nation are so worn down as to be incapable of protecting their vital nonmilitary targets within. Certainly, in long wars of attrition, the drain on the economy, society, and even the morale of the population can be a type of "countervalue targeting"—but in an indirect sense. One could argue that a sea blockade is a countervalue war of attrition; however, it is unlikely that any aggressor would allow such a blockade, given any means to prevent it. We could logically assume then that an effective blockade is only possible after a successful counterair war and hence becomes a part of the annihilative campaign.

14. The US Strategic Bombing Survey and many airpower advocates argue that we *were* in fact successful in our bombing strategy of strategic paralysis against the Germans, resulting in their ultimate defeat. This misses the point, as our victory required the occupation of their country and the nearly complete annihilation of their armed forces and economic structure. Germany was near death, its body battered beyond recognition. It would be disingenuous to describe this as any sort of simple paralysis.

15. Some argue that another reason for our lack of success (if, in fact, this is true) was that the AAF was never permitted to carry out its war plan. The siphoning off of resources, first to the Mediterranean to help the British and then to the Pacific, never allowed the full weight of our airpower effort to be applied on Germany.

16. Frederick A. Talbot, *Aeroplanes and Dirigibles of War* (London: William Heinemann Publishers, 1915), 133.

17. Thomas A. Fabyanic, *Strategic Air Attack in the United States Air Force: A Case Study* (Kansas State University: Military Affairs/Aerospace Historian Publishing, 1977); reprint (Maxwell AFB, Ala.: Air University, Air War College Report No. 5899, 1976), 64, 84, 104–06; agreement can also be found in Saundby's book that airplanes simply could not carry and accurately deliver the necessary bomb loads, not to mention having inferior bombs. Air Marshal Sir Robert Saundby, *Air Bombardment: The Story of Its Development* (New York: Harper

Brothers, 1961), 21–26; a similar situation occurred in the Korean War where stories abound of the tenacity of Korean bridges and US inability to bring them down. "Bomber Command computed that 13.3 runs were required to destroy an average bridge." By any measure, though, the west rail bridge at Seoul was not average. The bridge was still standing after four weeks of heavy bombardment and lest you think on-going repairs by the enemy were to blame, nine B-29s and 54 tons of bombs in one afternoon could not drop it either. Navy dive bombers, working all day, finally did the job. Robert F. Futrell, *The United States Air Force in Korea, 1950–1953* (Washington, D.C.: US Government Printing Office, 1983), 130.

18. William Bradford Huie, *The Fight for Airpower* (New York: American Book-Stratford Press, Inc., 1942), 261–62.

19. Theoretically, wars conducted using a strategic paralysis strategy can be concluded earlier because of a lower level of costs on both sides. For example, in annihilative or attritive wars, it may be much harder to stop the conflict and save face if losses are already high than it would be if casualties or damage were relatively light. This applies to attacker as well as defender, as Trenchard observed: "Air can carry much more destruction to the enemy per man with a minimum loss of life than any other form of warfare. . . . Though the cost of life and limb of the bomber crews may on occasion be heavy, the world has never known such a small rate of loss in comparison to the population of the nation, taking into consideration the magnitude of these great bombing battles and the effect they are having in shortening the war." Air Marshal Sir Hugh M. Trenchard, *Air Power: Three Papers,* "The Effect of the Rise of Air Power on War" (London: Air Ministry, Directorate of Staff Duties, 1946; reprint, 1948), 10 and 12. Of course, the other salient feature in strategic paralysis warfare is that the enemy really has no other choice at this stage. He either accepts terms or faces continued and mounting societal devastation (increasing annihilative pressure, one might call it). This strategy simply allows the enemy more face-saving opportunities than would be available under all-out war.

20. Loss here could also mean the negation or finding of a successful countermeasure to the technology in question.

21. Theoretically, one could still paralyze an enemy with nonprecise (annihilative type) weapons. But it would be costlier and more bloody, much like a doctor who is forced to do surgery with blunt knives rather than a scalpel or laser. He might get the job done, but the injury to the surrounding tissue would be prohibitively high and he might even lose the patient.

22. The question arises as to whether any other country except the United States could employ or would be interested in ever pursuing this strategy. The answer, it seems, is hidden beneath several considerations. First, strategic paralysis should be attractive to any country that desires a quicker, less costly victory. However, because of the requirements for high technology and aerospace control, it is not likely to be a viable option except for the most advanced and wealthy countries. Secondly, because strategic paralysis promises a less costly solution to both sides, it should be a strategy appreciated most by countries who are sensitive to civilian and military casualties and those who place a high value on human rights. However, as human rights considerations seldom preoccupy the minds of most aggressor nations, strategic paralysis may be looked upon as a strategy of weakness and, therefore, not a likely candidate. Thirdly, strategic paralysis, as we shall see later, is not suited for every action. Neither a rogue country pursuing territorial acquisition nor a country fending off a territorial attack is likely to use a strategic paralysis approach. The country being attacked is unlikely to acquiesce unless physically occupied, and the attacker—realizing this—will most likely have to resort to another method.

23. This would probably be Mao Tse-tung's solution. Even though his country was occupied by Japan in the 1930s and 1940s, he advocated a guerrilla war of attrition with the Japanese until such time as his forces were strong enough to move to a conventional level.

24. By this I mean a country surrendering its sovereignty solely because of aerial attack.

25. Even these examples miss the point somewhat. The airpower applied against Germany and Iraq was used to force them to give up what they had already illegally taken. If, on the other hand, Germany or Iraq had tried to use airpower alone to satisfy their territorial ambitions, it is not likely they would have succeeded.

26. Warden, 14.

27. He goes on to say: "Airpower has widened the choices available for the enforcement of a nation's will on another. It can facilitate invasion or occupation or it can systematically destroy the country in total. The conduct of war will be determined by whether the purpose is to destroy the enemy or to capture him (take possession or eliminate him as an economic and political factor). The deeper the civilization and national pride, the less likely they are to surrender. More backward people accustomed to rule of force and less ardent in their racial and national awareness can be made to submit more easily." Maj Alexander P. de Seversky, *Victory Through Air Power* (New York: Simon and Schuster, 1942), 101–02.

28. Quoted in Louis A. Sigaud, *Douhet and Aerial Warfare* (New York: G. P. Putnam's Sons, 1941), 58.

29. From Robert D. Heinl, Jr., ed., *Dictionary of Military and Naval Quotations* (Annapolis: US Naval Institute, 1960), 109.

30. I am indebted to Dr Bob Pape, professor at the School of Advanced Airpower Studies, for his insight, ideas, and the visual presentation in figure 3. The critical study of *end states* is one of Dr Pape's concerns, and I refer the interested reader to his work, as I cannot do it justice in this paper.

31. Maj Muir S. Fairchild, "The Aim In War," TMs, lecture number AF-3-L, Air Corps Tactical School, 27 May 1940, 15. From the USAF Historical Research Agency, Document No. 248.2021 A-3. It appears (from pencil marks on the original) that this lecture was also given previously by lst Lt H. S. Hansell on 22 March 1938 and perhaps again on 28 March 1939. USAF Historical Research Agency, Document No. 248.2019 A-2.

32. Sir Basil Henry Liddell Hart, *Thoughts on War* (London: Faber and Faber Ltd., 1944), 42.

33. Fairchild, 13–15.

34. Trenchard, 11. "Many times it is asked: Can we win the war by bombing alone? I do not know. I have never claimed that we can. Equally, I have never suggested that we cannot. The answer to the question brings us to the great divergence between the old types of warfare and the new. Nevertheless, this war has admittedly shown the tremendous power of the bomber. It has surely shown what it can do in Germany. It has destroyed many vitally important production factories, and damaged many others; it has destroyed great industrial towns, and is slowly but surely destroying the normal life of their people. This could not have been done by any other weapon."

35. This is a classical Douhetian response mechanism where the population is supposed to be so terrified by the bombing that it rises up against its government and throws it out.

36. Admittedly, this third mechanism could work under annihilation or attrition strategies as well. However, strategic paralysis should make the decision easier for the enemy due to the lower losses (sunk costs) at the outset.

Chapter 3

Choosing the Right Targets

The most complete and happy victory is this: to compel one's enemy to give up his purpose, while suffering no harm oneself.

— Belisarius

Douhet called them "vital centers, Curtis LeMay "vital targets," Jomini referred to them as "decisive strategic points," Bomber Harris labeled them (derisively) "Panacea targets," Liddell Hart saw them as the enemy's "Achilles heel," Billy Mitchell said they were "nerve centers," and Clausewitz called them "centers of gravity." In essence, they were all referring to the same thing. Military leaders have always sought targets that promise a quick, decisive victory. Perhaps that is why the search for an enemy's center of gravity puts a glimmer in every strategist's eye. They desire to find that single target or set of targets that, once destroyed, yields victory.

As you can readily appreciate from the varied expressions used above, target selection lies at the heart of military doctrine and theory. If "aiming your effort" is important for the ground commander, as Clausewitz would say, it is much more so for the air commander. Airpower is expensive and precious.[1] It can put an enormous amount of fire on an enemy position, but it is costly and difficult to sustain. A bomb that is dropped in error or hits something insignificant after being flown half-way around the world is no small loss. This assessment is unlikely to change anytime soon. The physics of flight, the costs of technology, and the competing interests of modern societies will all help to keep the costs of airpower very high.

This chapter examines the first ingredient in a successful strategy of strategic paralysis, that of selecting the best targets. It first explores the history and theory of target selection, concentrating on the targeting theories of Carl von Clausewitz and Baron Antoine Jomini. It then looks at the airpower targeting theories of Giulio Douhet, Billy Mitchell, B. H. Liddell Hart, and John A. Warden III. After this presentation, chapter 4 continues one's look at other targeting theories, emphasizing those which advocated specific target sets. Finally, chapter 5 suggests an alternative way of thinking about an enemy's most important targets.[2]

The Theories of Clausewitz and Jomini

The idea of a center of gravity is an important concept, because it attempts to describe a means of striking at an enemy in such a way as to bring him to defeat as quickly as possible with the least number of casualties. As significant as this idea is for land and sea forces, its potential impact on the application of airpower is monumental. If "airpower is targeting," as some contend, then the selection of those targets is the most critical component of any airpower strategy.

Military leaders have always sought a quick and decisive victory. Many reasons, ranging from efficiency to humanitarianism, have been used to explain this desire, but they usually center on this understanding: all wars are costly in time, lives, and treasure, and, therefore, it is to no one's advantage to drag them out.[3] It is this desire to reduce the horrors of war (at least on our side) that motivates us to search for the enemy's Achilles heel.

Our attention now shifts to the Clausewitzian notion of strategic or national centers of gravity. When Clausewitz coined the term *center of gravity* in the early 1800s, the enemy's armed forces and, in particular, his land force were thought to be his center of gravity. Defeat his army, and surrender should follow. Although this may have been correct in practice, it was never really true in theory. The enemy's armed forces were a target only because they stood between the aggressor and his real objective, generally the ruling power who was supported by the masses who, in turn, were protected by the military. When their army was defeated, the ruler and the masses had the choice of surrendering or suffering further hardship. Thus, wars generally ended when the armed forces were defeated. Airpower, however, changed this by allowing bypass of enemy land and sea forces to strike directly at the real objective, the enemy's heart and soul. What constitutes the enemy's heart and soul? Are there targets, in the Clausewitzian sense, that are key to the defeat of any enemy? These two questions, the essence of this section, form the foundation of all modern airpower targeting theory.

Clausewitz

No one has had a greater influence on thinking about an opponent's key targets than Carl von Clausewitz.[4] Though certainly not the first military theorist to explore this issue, he is apparently the first to coin the term center of gravity. Therefore, it is important to plumb the depths of Clausewitz's writings on the subject. This is a difficult task because Clausewitz never completed his work. On the envelope containinig his manuscripts was a prophetic warning: Should his work be interrupted by death, what would be found would be a "shapeless mass of ideas, open to endless misconceptions."[5] Another reason for difficulty, especially as it relates to the topic, is that most

of his ideas on centers of gravity come from his sometimes "one-sided or contradictory" Book Six (which historian Michael Howard said was badly in need of revision "if its lessons were to be clearly brought out") and from his essayistic later chapters.[6] Nevertheless, his ideas have much to offer for this study.

Centers of Gravity. As testimony to Clausewitz's lasting influence and intellect, many modern-day military leaders (e.g., Gen Norman Schwarzkopf, Gen Colin Powell, and Col John Warden) still define centers of gravity largely as he did: "The hub of all power and movement, on which everything depends. That is the point against which all our energies should be directed."[7] For Clausewitz, and many other military leaders, finding the enemy center of gravity is a very important objective indeed. However, as with much of his work, Clausewitz presents many other ideas on the same subject that greatly expand and obscure his initial definition. For example, he states that the goal of any commander should be to identify and attack the enemy's single center of gravity, but admits there may be more than one. He tells us one can hardly go wrong by attcking an enemy's physical force, but rather obliquely adds that a center of gravity can be a nonphysical thing, such as public opinion as well. However, in the final analysis, the main effort, he believed, should still be directed against the major or concentrated battle that was, in essence, the center of gravity of the entire conflict, as "only a great battle can produce a major decision."[8]

Clausewitz attaches great importance to his idea of identifying an enemy's center of gravity for the same reasons given today—to get the most impact for the least effort. "It is, therefore, a major act of strategic judgment to distinguish these centers of gravity in the enemy's forces and to identify their spheres of effectiveness."[9] As Bernard Brodie writes in his commentary to *On War,* if you win the major objective the minor ones will follow, but if you start on the minor ones (with certain exceptions) you risk wasting effort.[10] Clausewitz expanded: "A center of gravity is always found where the mass is concentrated most densely." Therefore, in his mind, this represented the most effective target for a blow. He also envisioned a center of gravity in the cohesiveness of fighting forces, of either a single state or within an alliance of states.

> The fighting forces of each belligerent—whether a single state or an alliance of states—have a certain unity and therefore some cohesion. Where there is cohesion, the analogy of the center of gravity can be applied. Thus, these forces will possess certain centers of gravity, which, by their movement and direction, govern the rest; and those centers of gravity will be found wherever the forces are most concentrated. But in war as in the world of inanimate matter the effect produced on a center of gravity is determined and limited by the cohesion of the parts. In either case, a blow may well be stronger than the resistance requires, and in that case it may strike nothing but air, and so be a waste of energy.[11]

At least two ideas in this passage warrant further discussion. First, Clausewitz contends that the optimum point for attack (if the enemy's

cohesion is good) is the point where his armed forces (and perhaps those of his allies) are concentrated. This prerequisite for cohesion is an interesting one. If the enemy does not have cohesion, then the search for a center of gravity is futile. The idea is logical; that is, the shock or impact of a strike to an enemy's center of gravity will have a much greater effect if all of the parts are solidly connected. In this particular passage, Clausewitz leaves the impression that the center of gravity is found in the enemy's military force and that it can be attacked.[12] (This appears as a central tenet in his theory, as will be discussed later.) There are at least two good reasons why this point should be differentiated from any other: the first is to attack it; the second, to avoid it. Clausewitz is concerned with the former. This, at first, appears to be logically sound. A strike at the enemy's strongest point could be expected to achieve the greatest effect against him, both physically and psychologically. But knowing where to attack is only half the problem—success in battle is the other. A crucial idea not addressed by Clausewitz concerns the notion of vulnerability.

Centers of Gravity and the Issue of Vulnerability.[13] Clausewitz is relatively silent on the concept of vulnerability. This presents a dilemma or paradox of sorts. To him the center of gravity is just that, a center of mass or the most concentrated collection of the enemy's forces. Whether or not an attack would be successful at this point implies superior offensive capability. Furthermore, if an enemy's center of gravity is his strongest point, it is also likely to be his most heavily defended and, therefore, *least* vulnerable to attack. After all, if one can determine the enemy's point of greatest strength, then so can he.[14] However, to mount a successful attack on the enemy's strongest point implies a superiority of sorts, at least in numbers, equipment, tactics, intelligence, or morale. This seems to be in opposition to traditional military theory that emphasizes surprise, mass, and economy of force. Clausewitz also envisioned centers of gravity that had nothing to do with the enemy's armed forces.

Nonmilitary Centers of Gravity. An alliance can also be a center of gravity, as can a country's leaders, cities, and the morale of the population. Clausewitz stated: "The aim of war should be what its very concept implies—to defeat the enemy. . . . But what exactly does 'defeat' signify? The conquest of the whole of the enemy's territory is not always necessary."[15] Using examples from the Napoleonic wars, Clausewitz showed that if the enemy army was weak, taking a key city could win the battle; however, if the army was strong, taking everything, even occupying the entire country, as in Prussia in 1807, may not be sufficient to win without destroying his army first. "For Alexander, Gustavus Adolphus, Charles XII, and Frederick the Great, the center of gravity was their army. If the army had been destroyed, they would all have gone down in history as failures."[16]

Yet, in countries subject to domestic strife, or perhaps in countries where armies were of less importance, Clausewitz would identify the center of gravity as their capital city. Likewise, in smaller countries that relied on larger ones, the center of gravity might be found in the army of their protector. Clausewitz also conceived of centers of gravity in the "community of interest" in certain alliances, in the public's opinion, or in the personalities of the leaders in cases of popular uprisings. Wherever or whatever this key point was, Clausewitz was convinced that "it is against these that our energies should be directed."[17] Yet, in spite of it all, and perhaps because of his era and the weapons he had available to fight with, he still contended that "the central feature of the enemy's power may be—the point on which your efforts must converge—the defeat and destruction of his fighting force(s)."[18] This was, and would remain, the best way to begin a conflict and in every case would be a very significant feature of the campaign.[19] Clausewitz went on to reinforce this belief by stating:

> The acts we consider most important for defeat of the enemy are the following:
>
> 1. Destruction of his army, if it is at all significant.
> 2. Seizure of his capital if it is not only the center of administration but also that of social, professional, and political activity.
> 3. Delivery of an effective blow against his principal ally if that ally is more powerful than he.[20]

Though Clausewitz put great importance on defeating the enemy army,[21] he admitted there could be other centers of gravity as well.

Multiple Centers of Gravity. The entire notion of a center of gravity is singular in concept. After all, how can you have two "centers" of gravity? This is not only a physically impossible situation but an oxymoron.[22] Clausewitz, however, had no such inhibitions. Although he stressed the importance of identifying a singular center of gravity, he recognized there could be more than one: "The center of gravity of France lies in the armed forces and in Paris."[23] Recognizing more than one center of gravity seemed to compel Clausewitz into a discussion on the importance of alliances.

Clausewitz dealt with the issue of multiple centers of gravity most prominently when dealing with alliances. Unfortunately, it was in analyzing the relationships between nations that Clausewitz was the most abstruse. In discussing an alliance system or several supposed centers of gravity within a nation itself, Clausewitz had this to offer: "From this it follows that the concept of separate and connected enemy power runs through every level of operations, and thus the effect that events in a given theater will have elsewhere can only be judged in each particular case. Only then can it be seen how far the enemy's various centers of gravity can be reduced to one."[24] Central to this theme, but perhaps in opposition to his idea of the importance of a center of gravity, is his concept of "linked engagements." Clausewitz

wanted us to think about war not as a collection of separate campaigns but rather as "a chain of linked engagements." The danger in failing to regard war in this way was in succumbing to the idea that the capture of certain geographical points or the seizure of certain provinces were of some value in and of themselves. To think so, Clausewitz feared, might lead to definite disadvantages. Rather, every battle should be seen as it relates to the final objective. "One could almost put it this way: just as a businessman cannot take the profit from a single transaction and put it into a separate account, so an isolated advantage gained in war cannot be assessed separately from the overall result."[25]

How should this concept of linked engagements be taken? At first glance, it appears to be in conflict with the importance Clausewitz placed on attacking an enemy's single center of gravity. After all, if one is not to think of taking one point or a single engagement as something critical, but instead to look at them all, then of what value is there in attacking a center of gravity? Clausewitz seems to imply that individual engagements gain importance only as they contribute toward the final objective. Therefore, if these engagements are viewed as steps in defeating an enemy's center of gravity (which could be quite large and composed of many parts), then this statement is consistent with his earlier thoughts.

A Disclaimer and an Exception. If all of this seems a bit imprecise, apparently Clausewitz felt the same way: "We want to reiterate emphatically that here, as elsewhere, our definitions are aimed only at the centers of certain concepts; we neither wish nor can give them sharp outlines."[26] Nor was Clausewitz so dogmatic that he could not foresee exceptions: "The principle of aiming everything at the enemy's center of gravity admits of only one exception—that is, when secondary operations look exceptionally rewarding. But we must repeat that only decisive superiority can justify diverting strength without risking too much in the principal theater."[27]

A Summary of Clausewitz's Ideas. Clausewitz contributed so much to this subject that it is often difficult to distill his ideas into concepts that are manageable. At the risk of oversimplifying his theory, one can make some general statements on what he thought to be most important. Clausewitz argued strongly for the importance of identifying and attacking the single center or source of an enemy's strength. After this center was identified, Clausewitz advocated directing everything against it, for that is where the most impact will be achieved. Finally, he saw the enemy's strength in many different elements of their society, from key cities to alliance partners, but reasoned that a unified attack on their military would rarely, if ever, be wasted effort. If Clausewitz seemed preoccupied with force-on-force attacks and showed less than a stellar insight into the complexities of modern societies, it is understandable given the day and age in which he lived. He

knew nothing of modern communications, transportation, or industry, let alone the uses of space, nuclear energy, or the potential of modern airpower. Even so, the extraordinary breadth and depth of his "preliminary" comments would have made a final distillation of his thoughts most interesting.

Jomini

Baron Antoine Henri Jomini is of interest here for his writings on the importance of choosing the right targets for attack. Jomini believed that maneuvering to attack the enemy at the decisive time and place with the greatest possible force was the key to victory. His method of warfare was Napoleonic in description and came close to one of Clausewitz's declarations that the object in war was the destruction of the enemy's armed forces. Unlike Clausewitz, however, Jomini was prescriptive. Jomini does not use the term center of gravity in his work, but instead refers to *decisive strategic points.* It was Jomini's contention that the discovery of these points was critical in war because their capture or destruction could ensure success. He advocated, as did Clausewitz, the idea of hitting the enemy's decisive strategic points with as much mass as possible. "The art of war consists in bringing into action upon the decisive point of the theater of operations the greatest possible force.[28]

Decisive Strategic Points. Jomini recognized that not all points (or targets) in the theater of war were of the same strategic value. Their importance depended on geographical location, criticality to the lines of communications, and whether they were seats of power in government.[29] While his discussion is a little confusing, his message is significant. "There are points . . . whose importance is constant and immense; the[se] . . . are called *decisive strategic points.* I think the name of *decisive strategic point* should be given to all those that are capable of exercising a marked influence either upon the result of the campaign or upon a single enterprise."[30] (Emphasis in original.) Jomini is suggesting that the capture or destruction of a key point can be decisive by itself in determining the outcome of the battle. What are these points? Here, Jomini has precious little to add, saying only that "all capitals [are] *decisive strategic points* for the double reason that they [are] not only centers of communications but seats of power and centers of government."[31] He goes on to add: "The greatest talent of a general and the surest hope of success lie in some degree in the good choice of these points. This was the most conspicuous merit of Napoléon . . . [who] was convinced that the best means of accomplishing great results was to dislodge and destroy the hostile army, since states and provinces fall of themselves when there is no organized force to protect them."[32]

Jomini's insight here is interesting. He flatly believed that the taking of *decisive strategic points* could have a "marked influence" on the campaign.

Yet, he agreed with Clausewitz (in citing Napoléon) that attacking the enemy's armed forces was the proper method since states and provinces fall when their armies are defeated.[33]

It appears that both Jomini and Clausewitz, in their own way, recognized that the destruction of the enemy's armed forces was not the real objective in war. Rather, it was forced upon them because of their inability to reach behind it. It would take nearly 100 years for that capability to arrive; but once the airplane had come, it forever changed the way men would think and fight.

The Airpower Theories of Douhet, Mitchell, Liddell Hart, and Warden

While Clausewitz and Jomini, both possessors of great wisdom, correctly realized the significance of many targets behind the front lines, they could do nothing but attack the fielded forces because they lacked the means to bypass them. Airpower was the key that opened the door to assessing the vulnerability and significance of everything a country held dear. The race was on to find the best targets for airplanes to attack. Giulio Douhet's theories became the foundation for what many believed was the best way to employ airpower.

Douhet

Gen Giulio Douhet had less to say on the subject of what constituted an enemy's sources of strength than Clausewitz; but his ideas, first published in 1921, were no less profound. One could even argue that Douhet's ideas were similar to Clausewitz's.[34] Douhet saw the destruction of the enemy air force as the key to success and number one priority, much as Clausewitz emphasized the defeat of the enemy army. To Douhet, command of the air meant victory because everything of the enemy's then became vulnerable.

Like Jomini, Douhet never explicitly uses the term center of gravity in his writings, yet it is clear that he envisioned a similar concept in the opportunities and results airpower promised. If there was one center of gravity-like target, emphasized by Douhet, it would have to be the enemy's air forces and their ability to deny you control of the air. Douhet was adamant. In war, one must first achieve command of the air by attacking the enemy's airfields, aircraft factories, and other foundations of airpower because: "In consideration of the advantages which ensue from the command of the air, it must be admitted that the command of the air will have a decisive influence on the outcome of the war."[35] The concept was straightforward: destroy or neutralize your opponent's air force and everything else can be held hostage to the mighty power of the air attacker. For Douhet, this strategy was the quickest and most economical way of ending the war. He advocated attacking both the

morale and materiel means of the enemy after command of the air was achieved, but leaned strongly toward enemy morale as preeminent.

Command of the Air—A First Priority. In all of Douhet's thoughts on the subject, nothing comes home clearer than the requirement to win command of the air first.

> By the expression "command of the air" I do not mean supremacy in the air nor a preponderance of aerial means, but *that state of affairs in which we find ourselves able to fly in the face of an enemy who is unable to do likewise. . . . The command of the air provides whoever possesses it with the advantages of protecting all his own land and sea territory from enemy aerial offensives and at the same time of subjecting the enemy's territory to his own offensives.*[36] (Emphasis in original.)

The importance of winning command of the air was paramount because with it came ultimate victory: "A nation which once loses the command of the air and finds itself subjected to incessant aerial attacks aimed directly at its most vital centers and without the possibility of effective retaliation, this nation, whatever its surface forces may be able to do, must arrive at the conviction that all is useless, that all hope is dead. This conviction spells defeat."[37] (It should be noted that Douhet admitted to only one exception in first gaining command of the air, and that was when confronting an enemy who had a very weak air force. In this case, attacks on his vital centers could begin immediately.)

Douhet paid particular attention to the dire consequences that loss of command of the air would have for the enemy and how decisive the results could be. Not being one to give much credit to the endurance capabilities of his fellow citizens, he envisioned societal chaos and collapse under the strain of heavy aerial bombardment: "And if on the second day another ten, twenty, or fifty cities were bombed, who could keep all those lost, panic-stricken people from fleeing to the open countryside to escape this terror from the air? A complete breakdown of the social structure cannot but take place in a country subjected to this kind of merciless pounding from the air."[38] Then comes Douhet's remarkable conclusion: "The time would soon come when, to put an end to [the] horror and suffering, the people themselves, driven by the instinct of self-preservation, would rise up and demand an end to the war—this before their army and navy had the time to mobilize at all."[39]

Vital Centers. Douhet had many interesting ideas, not the least of which were his thoughts on targeting the enemy's key elements. These he called vital centers. In so doing he recognized, like many others, that not all targets were of equal importance. Since airpower should not be wasted, military leaders should determine those targets most important to the enemy and concentrate their efforts on them. This concept is similar to those of Clausewitz and Jomini regarding an attack on the enemy's most valuable and concentrated points. Douhet considered vital centers those things which if attacked would crush the material and moral resistance of the enemy. "The maximum returns from aerial offensives," Douhet reasoned "must be sought beyond the field of battle. They must be sought in places where effective counteraction is negligible and where the most vital and vulnerable targets

are to be found—targets which are, though indirect, much more relevant to the action and outcome on the field of battle."[40] Douhet listed these vital centers as the enemy's concentrated industries, large population centers, communication lines, hydraulic resources, railroad junctions and depots, and military storage areas. But it was only by bombing his most vital *civilian* centers, Douhet reasoned, that enough terror could be spread through the nation to quickly break the enemy's material and moral resistance.[41]

Attacks on the Population. It would appear that Douhet thought the most vulnerable and enticing target was the morale of the enemy civilian population. "To bend the enemy's will, one must put him in intolerable circumstance; and the best way to do that is to attack directly the defenseless populations of his cities and great industrial centers."[42] Whether he would subscribe to the idea that the civilian population was always a center of gravity (in a Clausewitzian sense) is unclear, but he assiduously claimed that "once command of the air is conquered, the air force should attempt to carry out offensives of such magnitude as to crush the material and moral resistance of the enemy."[43]

Target Selection. Determining exactly what Douhet actually meant about targets and their importance is somewhat tricky. He writes very little on the subject and what he does write is vague—an unfortunate circumstance, considering the importance of target selection to airpower.[44] He acknowledges, however, that choosing enemy targets is a most delicate operation: "The truth of the matter," Douhet claims, "is that no hard-and-fast rules can be laid down on this aspect of aerial warfare. It is impossible even to outline general standards, because the choice of enemy targets will depend upon a number of circumstances, material, moral, and psychological, the importance of which, though real, is not easily estimated." Indeed, Douhet recognized that it was in target selection "that future commanders of Independent Air Forces will show their ability."[45] This was a task made more awesome because the air force had the potential capacity to destroy every enemy objective, whether on land or sea. "All this," Douhet added, "sounds very simple; but as a matter of fact the selection of objectives, the grouping of zones, and determining the order in which they are to be destroyed is the most difficult and delicate task in aerial warfare, constituting what may be defined as aerial strategy." Furthermore, objectives constantly vary in war. "The choice of them depends chiefly upon the aim sought, whether the command of the air, paralyzing the enemy's army or navy, or shattering the morale of civilians behind the lines."[46]

That Douhet paid so little attention to targeting, or as he called it "aerial strategy," is disconcerting. After all, airpower is only as effective as the targets it can strike or put at risk.[47] Douhet may have given target selection so little attention because he believed the selection of objectives was highly variable, very difficult, and should be left (even in theory) to the air commander. Other reasons could be related to the novelty of airpower in his era, his infatuation with it, and the need to spend most of his time defending his ideas rather than adding to them.

Weaknesses in Douhet's Theories. Beyond a less than adequate discussion on targeting, there are other weaknesses in Douhet's ideas. Historians are quick to point out that most of what Douhet says is presented without support. Clausewitz, on the other hand, was careful to provide historical examples for his ideas whenever possible. Historian Edward Homze writes: "The evidence supporting Douhet's major assumptions—the capability and destructive power of the heavy bomber, the impotence of air defense and the fragility of a modern industrial society in the face of heavy bombing—was thin and inconclusive. Like most prophets, Douhet was long on prognostications and short on facts."[48] Perhaps a reason for this was that Douhet was on the leading edge of the airpower revolution. He had few predecessors and only the inconclusive evidence of airpower in World War I to use as support. Clausewitz had the benefit of hundreds of years of land warfare on which to build his case.

Regardless of the baggage Douhet's ideas carry, they have had an enormous impact on the way modern air forces employ airpower. His formula of first gaining air superiority and then attacking the enemy's vital centers describes precisely the way in which coalition airpower was employed against Iraq in Desert Storm. His obvious shortcomings and nearsightedness were more than compensated for by the benefits of his theories on airpower and warfare.

Summary of Douhet's Ideas. Two key ideas are revealed in a summary of Douhet's central propositions: first, destroy the enemy's air forces to achieve command of the air; second, attack his vital centers, especially his population. Hopefully, after the first step, the enemy will realize all hope is lost and sue for peace. The second step, systematic annihilation of either his population or vital centers, then becomes unnecessary. Is it reasonable to conclude, as we have above, that Douhet considered the enemy's air forces as the center of gravity? Or was the destruction of the enemy air force just a means to an end, as was the army in Clausewitz's and Jomini's day?

It would appear that Douhet considered the enemy's air force as his center of gravity.[49] Certainly, destruction of the enemy air force is necessary for his final collapse; but more importantly, Douhet implied that it was also sufficient. If the enemy's population is so terrified from aerial bombardment that he must sue for peace before his army and navy even have a chance to mobilize (as Douhet envisioned), then it could be said that winning command of the air by destroying his air force was the single action that caused his downfall.

Unfortunately, this understanding is no different from that of previous land war theorists. Douhet has merely moved the enemy's army to the sky and made its defeat the key to victory. Isn't this just like a country surrendering after its land force has been destroyed? But Douhet should not be dismissed as merely a Clausewitz look-alike in air force clothing. In spite of his obvious shortcomings, Douhet's real contribution comes from his delineation, however sketchy, of a nation's two key sources of strength in war and their vulnerability to attack by airpower: the will of the people and the nation's vital war-making centers. This was a significant milestone in the theory of warfare.

People had been fighting against armies and navies for so long they had come to believe that defeat of those armies and navies was the true objective. Douhet pursued the same avenue, albeit through another form, and in so doing helped sharpen the understanding of what war was all about.

Mitchell

Another airpower advocate of considerable importance was Billy Mitchell.[50] Brig Gen Billy Mitchell's ideas dealt more with tactics than strategy but were nevertheless significant, given his place in history. Curiously, Mitchell—like Douhet—had little to say about the selection of vital targets, preferring instead to stress the importance of airpower: "The influence of airpower on the ability of one nation to impress its will on another in an armed contest will be decisive."[51] His few comments regarding targeting, however, were quite similar to Douhet's:

> To gain a lasting victory in war, the hostile nation's power to make war must be destroyed—this means the manufactories [sic], the means of communication, the food products, even the farms, the fuel and oil and places where people live and carry on their daily lives. Not only must these things be rendered incapable of supplying the armed forces but the people's desire to renew the combat at a later date must be discouraged.[52]

Much as Douhet had advocated, Mitchell proposed destroying the enemy's war-making capability and influencing the "peoples' desire to renew the combat" by using explosive bombs and gas. Their use, Mitchell theorized, would result in a complete evacuation of the citizenry and the cessation of all industry. "This would deprive armies, air forces and navies even, of their means of maintenance. . . . In the future the mere threat of bombing a town by an air force will cause it to be evacuated, and all work in munitions and supply factories to be stopped."[53]

As early as 1926, Mitchell had questioned the need to defeat an enemy's army in the field; instead, he advocated using the airplane as a method to go directly to the enemy's heart. Mitchell argued that the desired method of prosecuting war was to neutralize the vital centers of an enemy country in order to paralyze his resistance. But since the enemy was not stupid, he would lay out his army in front of these vital centers to protect them. This, according to Mitchell, "led to the theory that the hostile army in the field was the main objective, which it was." However, in the future, by using "an air force," one would be able to strike directly at those vital centers.[54] Significantly, Mitchell sides with Douhet on this topic: Airpower can have a decisive impact upon the enemy's capability and will to continue the fight.[55]

Liddell Hart

Like so many military tacticians before him, B. H. Liddell Hart wrestled with the problem of selecting the right targets for attack. The idea of finding an enemy's center of gravity[56] seemed an alluring notion, compared to the high costs of trench warfare. Liddell Hart introduced his own term for the

concept, referring to vital enemy weaknesses as the "Achilles heel." According to Liddell Hart, aiming the effort at this vulnerable target is a means to achieve victory at the lowest possible cost.

> It is wiser to choose and combine whichever are the most suitable, most penetrative, and most conservative of effort[s]—i.e., which will subdue the opposing will at the lowest war-cost and minimum injury to the post-war prospect. For the most decisive victory is of no value if a nation be bled white in gaining it. It should be the aim of grand strategy to discover and pierce the *Achilles' heel* of the opposing governments' power to make war.[57] (Emphasis in original.)

Liddell Hart's Achilles heel analogy seems remarkably similar to Clausewitz's ideas.[58] Like Clausewitz, he wanted to find the one target that would give the most impact for the least effort.[59] He mentions that every modern country has key targets—essential mining areas and key manufacturing districts. A country can be dependent on overseas trade coming into its ports or so highly centralized that the capital city is the real "heart of its life." However, "In most cases there is a blend of these several factors, and in all, the regular flow of transport along its arteries is a vital requirement."[60]

The Airpower Difference. Liddell Hart also recognized, as did Douhet, that airpower could make the fundamental difference in war. While armies suffered from having to move in one dimension, aircraft were not so limited. Previously, to strike capitals and other vital centers one had first to dispose of the enemy's main force. This inevitably led, according to Liddell Hart, to the short-sighted, if natural, delusion that the armed forces themselves were the real objective. This could not have been further from the truth, as the evolution of airpower has shown.

> The air has introduced a third dimension into warfare. . . . Aircraft enables us *to jump over* the army which shields the enemy government, industry and people, and *so strike direct and immediately at the seat of the opposing will and policy.* A nation's nerve system, no longer covered by the flesh of its troops, is now laid bare to attack, and the progress of civilization has rendered it far more sensitive than in earlier and more primitive times.[61] (Emphasis in original.)

Liddell Hart's comments here are enlightening and to the point. He identifies the key targets in any country as the government, industry, and people, and recognizes airpower's ability to strike directly at them. "Air forces, . . . might also strike with decisive effect direct[ly] at 'a nation's nerve system', [and] its 'static civil centres' of industry."[62] Later, however, Liddell Hart falls away from his enthusiasm for airpower.

Misgivings. "In further study I came to realize that an air attack on industrial centres was unlikely to have an immediately decisive effect, and more likely to produce another prolonged war of attrition in a fresh form."[63] Liddell Hart's concern is based on a belief that nations collapse from within when exhausted from war. It then follows that the use of airpower only increases the destruction even if it reduces casualties.[64] On the other hand, Liddell Hart may have seen what Douhet had not—that increased air defense capabilities (fighters, flak, radar, etc.) had merely moved the trenches of World War I to 20,000 feet. Air forces, like those of land and sea, would first

have to be defeated face-to-face before any such benefits of airpower could be realized. According to Liddell Hart, airpower had simply become another counterforce weapon.

Warden

Probably the most well-known of modern airpower theorists is Col John A. Warden III, whose book *The Air Campaign* (published in 1988) is required reading at the USAF's Air Command and Staff College. It is widely believed that Colonel Warden and his Pentagon staff were instrumental in developing the strategic air campaign used so successfully against Iraq in Desert Storm. This makes his ideas of particular interest to this study.

Warden's theories are similar to Douhet's in that he believes air superiority must come first. By this, he means eliminating enemy forces that can interfere with air operations: "Clearly air superiority must be the first air priority because so much else—ground operations, close support, and interdiction—is heavily dependent on it."[65]

Achieving air superiority is as important to Warden as gaining command of the air was to Douhet. However, Warden, unlike Douhet, sees the gaining of air superiority as a prerequisite to victory rather than an end in itself. Air superiority is necessary because it opens the door for everything else airpower can bring to the conflict—specifically, attacks on the enemy's centers of gravity.

Selecting Targets. Warden proclaims that centers of gravity can exist at every level of warfare.[66] In other words, centers of gravity can be found at the tactical, operational, and strategic levels of war. Of interest here, however, are his views on the strategic level of war. As for definitions, Warden differs only slightly with the Clausewitzian view: "The term 'center of gravity' is quite useful in planning war operations, for it describes that point where the enemy is most vulnerable and the point where an attack will have the best chance of being decisive."[67] The key operative in this statement is the word "vulnerable." As already seen, vulnerability is not necessarily an inherent quality of the enemy's decisive point(s). In fact, quite the opposite could be true. (This is discussed in more detail in chapter 5.)

According to Warden the enemy's command element is always a center of gravity. In any case, "the thing to look for is the place where an investment in attack will yield the greatest return." In some cases, a "panacea" target actually may exist. Where these can be found, they should be attacked and reattacked with persistence."[68] Warden, like others before him, is convinced that certain key centers in any country warrant targeting for the impact they could have on the outcome of the battle. "At the strategic and operational level, inducing the enemy to make the desired concessions requires identification and attack of those parts of the enemy state and military structure which are most essential to the enemy's ability and desire to wage war."[69] Warden's key ideas will be discussed more fully in the next chapter.

Summary

This chapter has surveyed several military theorists' writings regarding an enemy's most vital strategic targets, analyzing the particular target or target-sets that are the most critical for his continuation in the conflict. A good deal of time was spent on Clausewitz, whose *center of gravity* is particularly enticing, even today, when one considers how to quickly employ forces against an enemy. Clausewitz and Jomini had concluded (even if reluctantly) that the enemy's armed forces were his center of gravity, but in fact they only provided protection for the real keys to the enemy's will and war-making potential. With the advent of airpower, men like Douhet and Mitchell argued for airpower's unique ability to strike directly at the enemy's heart, bypassing his surface forces. Yet, in order to do this, one first had to defeat the enemy's air forces, which, if strong enough, returned matters to a counterforce war of attrition. A more important contribution was in their probing of what constituted the real source of the enemy's power and identifying what targets were key in hastening his defeat.

With this as background, the next chapter continues to survey targeting theories in an attempt to distill and solidify a process by which any country's key strategic targets can be identified.

Notes

1. When airpower resources are plentiful, target selection is easy. "However when the power resources are scarce, critical target selection is more difficult. Not only must the comparative worth of the targets be measured, but the available strike resources must be measured and allocated against them." AFP 200-17, *An Introduction to Air Force Targeting,* 11 October 1978, 9-2.
2. The national elements of value, dynamic targeting model, in chapter 5 takes into account the compensating interaction of any country's key sources of strength.
3. Contrary to popular belief, even Mao Tse-tung embraced this idea. Mao's only reason for drawing out the conflict was to allow his forces to build up their strength so they could attack on a conventional level and go for a quick victory. See "On Protracted War," by Mao Tse-tung in *Six Essays on Military Affairs* (Foreign Language Press: Peking PRC, 1972), 195–339. [Taken from a lecture Mao delivered in May 1938 at the Yenan Association for the Study of the War of Resistance Against Japan]; see also, Mao Tse-tung, *Mao Tse-tung on Guerrilla Warfare,* trans. by Samuel B. Griffith (New York: Praeger Publishers, 1961), 56, 98; for a more modern interpretation of this concept using the Vietnam War, see Vo Nguyen Giap, *How We Won the War* (Philadelphia: RECON Publications, 1976), 44–45.
4. Clausewitz's writings were first published by his widow in 1832, a year after his death.
5. Carl von Clausewitz, *On War,* ed. Michael Howard and Peter Paret (New Jersey: Princeton University Press, 1976), 70.
6. Ibid., 4 and 29.
7. Ibid., 596.
8. Ibid., 260.
9. Ibid., 486.
10. Ibid., 708.

11. Ibid., 485–86.

12. Sir Edward Hamley wholeheartedly agrees with Clausewitz's notion here. "It is clear that offensive operations cannot be conducted with unity, or directed with precision unless the object to be gained by them is kept distinctly in view by those who plan and execute the campaign. . . . Where territory [is] easily accessible to the power that assumes the offensive is the subject of dispute, the object will generally be to occupy the country in question." This may not stop the hostilities (e.g., Frederick's seizing of Silesia—war continued for 20 years); however, "the occupation of its chief city paralyzes a civilized country. If all great roads meet there—if it is the centre of trade, the focus of wealth and of civilization, and the seat of government—its occupation by an enemy is so ruinous that any terms he may impose will generally be less pernicious than his presence." The proper way, then, is . . . "the seizure of the capital coupled with such ascendancy over the defensive armies that they can never hope to retake it, that further resistance is felt to be hopeless leading only to national extinction, and that any terms not absolutely unendurable are accepted by the vanquished. . . . *The first military object must, therefore, almost invariably be the complete defeat of the enemy's forces in the field,* either as Ludendorff has put it, by annihilation or by attrition." (Emphasis added.) Gen Sir Edward Bruce Hamley, *The Operations of War* (London: William Blackwood and Sons, 1923), 54–57.

13. See also chapter 5 for a discussion on value and vulnerability.

14. Be that as it may, Clausewitz it seems, would still invite us to attack the enemy at this strongest (and most valuable) point.

15. Clausewitz, 595.

16. Ibid., 596.

17. Ibid.

18. Ibid.

19. Ibid.

20. Ibid.

21. Not everyone agrees with Clausewitz on this point, especially when airpower is considered. For example, Louis Sigaud in *Douhet and Aerial Warfare* states: "The objective in war has never been the destruction of the enemy forces. Their destruction or defeat is always simply one means to attain the fundamental aim. And that is to conquer by compelling the enemy to submit to one's will. If the aerial arm can create intolerable conditions, the enemy nation must admit defeat no matter what the status of surface operations is." Louis A. Sigaud, *Douhet and Aerial Warfare* (New York: G. P. Putnam's Sons, 1941), 58. This subject is addressed in more detail in chapter 4.

22. The *Academic American Encyclopedia* defines a center of gravity in this way: "The center of gravity of an object is a point at which all of the object's weight may be conceived as being concentrated. The center of gravity of a symmetrical, uniform object lies at the object's geometric center, but may lie outside the boundaries of irregularly shaped objects." This definition comes from the *Academic American Encyclopedia,* which is an on-line service of the Prodigy© Computer Network, September 1991.

23. Clausewitz, 633; as for Clausewitz's emphasis on identifying a single center of gravity, see page 619: "The first task, then, in planning for a war is to identify the enemy's centers of gravity and, if possible, trace them back to a single one," and also page 486: "Our position, then, is that a theater of war, be it large or small, and the forces stationed there, no matter what their size, represent the sort of unity in which a *single* center of gravity can be identified." (Emphasis in original.)

24. Ibid., 618.

25. Ibid., 182.

26. Ibid., 487.

27. Ibid., 618.

28. *Roots of Strategy,* book 2, *Three Military Classics,* ed. Brig Gen J. D. Hittle (Pennsylvania: Stackpole Books, 1987), 474.

29. It is interesting that these all appear to be references to locations and not an enemy force.

30. Ibid., 467.

31. Ibid.

32. Ibid., 468.

33. That Clausewitz's theories should agree with Napoléon's practice is understandable as Clausewitz used the Corsican's campaigns to support much of his work.

34. This is the notion of Lt Col Phil Meilinger as presented in his, as yet unpublished, manuscript "Giulio Douhet and Modern Airwar," SAAS, 1991, TMs [photocopy], 28.

35. Giulio Douhet, *The Command of the Air,* trans. Dino Ferrari (Washington, D.C.: Government Printing Office, 1983), 192.

36. Ibid., 95–96; Douhet's definition of command of the air is probably most similar to our modern-day definition of aerospace control.

37. Ibid., 149.

38. Ibid., 58.

39. Ibid.

40. Ibid., 126.

41. Ibid., 57.

42. Ibid., 282.

43. Ibid., 125.

44. On this particular point, there is widespread agreement. "Douhet neglected almost entirely the issue of target selection," says the editor of *Command of Air* on page ix; Bernard Brodie also agrees saying: "On the subject of what targets to choose after the elimination of the enemy air force, Douhet is extremely vague." Bernard Brodie, "The Heritage of Douhet," *Air University Quarterly Review,* Summer 1953, 122.

45. Douhet, 59–60.

46. Ibid., 50.

47. I am using airpower the way Douhet would here. I realize this ignores some other very important roles such as airlift, reconnaissance, etc.

48. Edward Homze, "The Continental Experience," *Air Power and Warfare,* Proceedings of the Eighth Military History Symposium (Washington, D.C.: Government Printing Office, 1979), 42.

49. As for Douhet's exception that in the absence of a strong enemy air force, the morale of the enemy population is the center of gravity, he had this to say: "If there is any possibility of attacking the enemy's resistance directly where it is found, it will be seized upon by anyone waging war who is trying to reach the objective of bending the enemy's will and knows that it cannot be done unless his resistance is broken." Douhet, 281.

50. It should be mentioned that Mitchell was not alone in his influence or ideas. Lt Col Edgar S. Gorrell "was one of the first American aviators to conceptualize the articulate a strategy of long-range aerial attack" at an enemy's most vital targets. His ideas were published virtually unchanged in Air Service Bulletins in 1918; Thomas A. Fabyanic, *Strategic Air Attack in the United States Air Force: A Case Study* (Kansas State University: Military Affairs/Aerospace Historian Publishing, 1977), 2–14.

51. Gen William Mitchell, *Winged Defense: The Development and Possibilities of Modern Air Power—Economic and Military* (New York: G. P. Putnam's Sons, 1925), 214.

52. Ibid., 126–27.

53. Ibid., 5–6.

54. From Mitchell's statement before the House Committee on Military Affairs in 1926, from Haywood S. Hansell, Jr., *The Strategic Air War against Germany and Japan* (Washington, D.C.: Government Printing Office, 1986), 4.

55. For more on Mitchell's contribution to airpower targeting, see Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907–1960,* vol. 1 (Maxwell AFB, Ala.: Air University Press, 1989), 6–8; also see Fabyanic, chapter 2.

56. He never uses the term center of gravity, perhaps out of disdain for Clausewitz. For various reasons, Liddell Hart is very tough on Clausewitz, referring often to a Clausewitzian "dogma" of "blood is the price of victory." This is an obvious, though I believe incorrect, reference to Clausewitz's writings on the importance of destroying the enemy's military force in achieving victory. While it is understandable that Liddell Hart, appalled by the carnage of World War I, sought other solutions to the "mutual mass-slaughter" of trench warfare, it seems

unfair to hang the blame altogether on Clausewitz. As we have seen above, Clausewitz was anything but dogmatic or prescriptive in his writings. I believe a closer and more balanced look at Clausewitz's work reveals a more modest position; Sir Basil Henry Liddell Hart, *Strategy* (London: Faber & Faber Ltd., 1954; reprint, New York: Penguin Books, 1991), 183 and 208 (page references are to the reprint edition).

57. Liddell Hart, 212.

58. There are differences. Liddell Hart is after a low-cost solution to war, while Clausewitz is after high value. These are not always synonymous and that is one of the fundamental problems of strategy. My thanks to Dr Harold Winton, professor with the School of Advanced Airpower Studies, Maxwell AFB, Alabama, for these insights.

59. Sir Basil Henry Liddell Hart, *Thoughts on War* (London: Faber & Faber Ltd., 1944), 42.

60. Ibid., 49.

61. Ibid., 50.

62. Liddell Hart, *Strategy,* 350. Interestingly, Liddell Hart also introduces here the notion of increasing vulnerability from the air as countries move higher on the economic ladder.

63. Ibid., 351.

64. Ibid., 359. Fortunately, increases in technology now allow airpower to do both.

65. John A. Warden III., *Planning the Air Campaign* (Washington, D.C.: National Defense University Press, 1988), 162.

66. Ibid., 10.

67. Ibid., 9.

68. Ibid., 44; also: "In *all* cases the enemy center of gravity must be identified and struck," 138.

69. Warden, "Employing Air Power," 5.

Chapter 4

More Targeting Theories

Against an army sailing through the clouds neither walls, mountains nor seas could afford security.

— Dr Johnson*

The notion of identifying, attacking, and destroying (or paralyzing) an enemy's most critical and lucrative point(s) is the bedrock of most military theory. It is the foundation for a quick, decisive victory in war. History has shown time and again the benefits of a quick victory and the ultimate penalties for dragging out a conflict. A good reason, then, for selective targeting is in the solution it hopes to provide in winning battles inexpensively, quickly, and decisively. (Put another way, "economy is the main principle of employment of airpower in war."[1]) This is a difficult, yet not impossible, task.

This chapter continues the review of targeting theories by expanding upon previous ideas and exploring some of the more recent and popular concepts in the field. The goal of all of this rather tedious review is to provide the reader with enough information so that the merits of the alternative targeting theory proposed in chapter 5 will become apparent.[2] Therefore, this chapter concentrates on some additional approaches to strategic targeting, analyzing their impact and relevance as well as their strengths and weaknesses.

Other Targeting Theories[3]

All of the theorists and practitioners mentioned in chapter 3 have in their own way expressed an immensely important idea: The identification of the enemy's key weaknesses is critical in his defeat and is therefore quite important in the effective application of airpower. Put another way, because airpower is a relatively precious commodity, it must be used where it will have the most impact. The location for that use is the heart of the matter. Traditionally, this has been the enemy's armed forces, but airpower has made it possible to strike directly at the enemy's center, bypassing his armed forces.[4] This idea deserves closer scrutiny.

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*From *Rasselas,* by a Dr Johnson, circa mid-1700s, in Auspex, *Victory from the Air* (London: Whitefriars Press Ltd., 1941), 7.

Interparliamentary Union

A 1931 report by the Interparliamentary Union entitled "What Would be the Character of a New War?" acknowledged the impact this "new" air weapon was to have in warfare.

> The conquest of the air and the creation of aerial weapons have brought about a new development in warfare. This theory may be explained by analogy if war is compared to a boxing match in which aerial weapons offer the possibility of scoring a "knock-out" whereas other weapons only permit of a victory on "points." The particular feature of aerial weapons which affords so great an advantage to one side is that they may be used for dealing a swift and unexpected blow at the "solar plexus" of the enemy defenses, which he can rarely if ever be sufficiently quick to parry.[5]

The authors go on to say, as Douhet had, that there are only two types of warfare. War can be waged against the "enemy's fighting forces" and against his "vital centers." It now seemed that the decisive battle between aerial forces would determine the outcome of the war, with the loser of the air battle "as defense-less against the victor in the air as he would have been against his victorious army in other days." The only difference would be that the loser now would be forced to realize his inevitable defeat from the threat (of bombing) to his vital centers instead of by having his territory occupied by land forces.[6]

The study concluded that just four industries "formed the root of all armaments and [were] therefore the necessary foundation of all national independence." They were the iron and steel industry, the chemical industry, the electrical industry, and the oil refineries.[7] But even these choices are not so straightforward, as one of their later articles goes on to say.

> If one of the belligerents has made up his mind to attack one of the establishments which make it materially impossible for the adversary to continue the war, where is he to stop in the choice of these establishments? All industry is linked up. The factory making war weapons becomes a military objective. But the factory which makes machines for it is equally important. The mines which supply the coal, the iron—can they be neglected? When one comes down to detail one is confused by the complexity which the industrial mobilization of a country represents.[8]

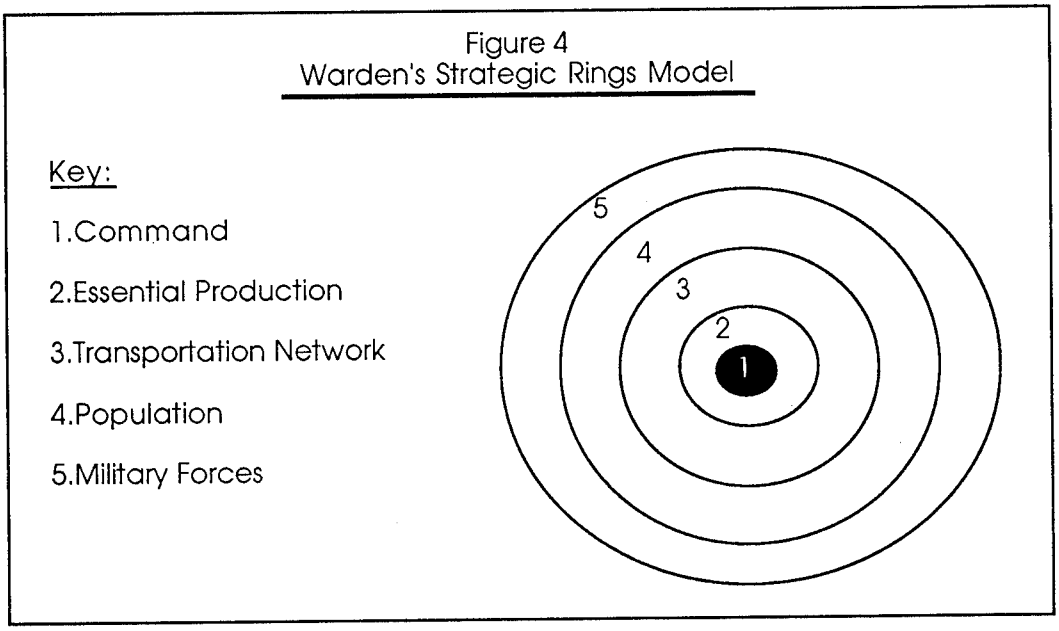
The study went on to cite as an example the iron and steel industry, which "cannot assure the quality and uniformity of its product without a testing laboratory. But this laboratory cannot carry on without scales, thermometers, microscopes, etc." And finally, "The factory which supplies the laboratory with its scales and its microscope, that which provides the filter-paper, [etc.] . . . is no less useful than the iron-ore mine or coal mine. Thus it is not this or that factory which manufactures in particular this or that weapon, but in reality the entire industry of the enemy country which it may become advantageous to stop by every means."[9]

Warden's *Strategic Rings*

Recently, Colonel Warden categorized a nation's key components or targets and their interactions. (The only graphic presentation of the subject this

author has ever seen, Warden's strategic rings diagram, figure 4, is very helpful.) But, like Clausewitz's idea, this presentation seems to allow only a static view of the situation.[10] Warden's model is essentially a five-ringed bullseye with the most important target, the enemy's command element, in the center. Moving out from the center, Warden labeled his rings essential production, transportation network, population, and enemy's fielded military forces.[11] Warden maintains that the command element (the bullseye) is the most critical of all targets. Destroy it, and the whole country collapses.[12]

Figure 4
Warden's Strategic Rings Model



It would be naive to think that any single element of national power operates in a vacuum, unaffected by the adverse conditions experienced by other elements. For example, an attack on the transportation network or ring would surely have an impact on each of the other rings.

Warden was not the first to attempt to categorize a nation's key targets. Lord Montague of Beaulieu, in a 1909 speech to the National Defense Association, discussed important targets for bombers and dirigibles. Great Britain, he surmised, could be paralyzed and made helpless after a sudden air strike at her "nerve centers," which he saw as the "government buildings, the Houses of Parliament, the central railway stations, the central telephone and telegraph offices, and the stock exchange."[13] Then, in 1926, Billy Mitchell identified an enemy's "vital centers" as his "centers of production, the centers of population, the agricultural districts, the animal industry, communications—anything that tended to keep up war."[14]

British Notions

British Air Commodore L. E. O. Charlton identified storage areas for oil and fuel as the most critical target for airpower because their destruction limits the air force's ability to fight. "If this should happen, the result would be complete prostration with no alternative left but to sue for peace on the enemy's terms. Such can only be the modern significance of the expression 'Mastery of the Air'."[15] The sources of electrical power are also targets of strategic value. In an obvious reference to what might happen in Britain, Charlton paints this picture of why an enemy should attack the electrical supply, "not so much because of the danger and inconvenience of darkness—there are supplementary means of avoiding that—but because the ventilation of the underground will fail and hordes sheltering within, closely crowded and wearing masks, will be suffocated after an interlude of blind panic in the darkness which will beggar description."[16]

Another influential British officer, Air Marshal Lord Tedder, described target systems for air attack as largely fitting into two classes: point targets and common denominators.

> Key points, or "panaceas," as they were cynically called by those who disbelieved in them, were vulnerable parts of the industrial or military structure, the destruction of which might wreck the whole: they included such targets as aluminum plants, accumulator factories, ball-bearing plants, . . . Army headquarters and similar places which were either centres of control or bottlenecks in vital industries. The selection of key points is designed to strike at the centre. If that is impossible the tendency is to be forced to strike at the points on the periphery—assembly plants, the depots, the dumps, the airfields, etc. Common denominator targets I would define as railways, canals, power plants, iron and steel plants, oil; targets which are probably dispersed geographically, but the destruction of which would collectively affect the whole war effort.[17]

The Luftwaffe

Even Hitler's Germany had its own list of important air targets prior to the Battle of Britain. Published by the German propaganda agency under the heading, "Can Airpower Break a Country?" Germany put forth a five-point plan of attack: absolute control of the Channel and English coastal area; progressive and complete annihilation of London with all its military objectives and industrial production; a steady process of paralyzing Britain's technical, industrial and commercial life; demoralization of the civil population of London and the provinces; and progressive weakening of the British fighter force. This is a fairly comprehensive list that includes nearly all industry, the people's morale, the enemy force, their communications (invoked by the word paralysis), and their leadership.[18] Dr Robert Knauss, a consultant on rearmament to the Luftwaffe, submitted a report in May 1933, arguing that modern industrialized societies offered targets whose destruction would halt the enemy's industrial production. He also thought, as did Douhet and others,

that destruction of the population centers offered the best possibility of breaking the enemy's morale.[19] German Air Force Manual Number 16 provides additional insight.

Manual 16 listed primary missions of the Luftwaffe: *combating enemy air forces, intervening in ground or naval actions, combating the sources of the enemy's strength,* and disrupting logistical lines to the front. (Emphasis added.) "Although combating the enemy's sources of military strength was viewed as essentially decisive, the manual stated that such action might not always be immediately effective since it might not exert an influence upon Army and Navy operations until too late."[20] It would seem from their writings that the German air force recognized the impact of hitting directly at the "enemy's sources of military strength" but chose not to do so for a variety of reasons. Since attacks by airpower tied down a substantial resource for a long time, it was only justifiable if "there was reason to expect that the war could be ended almost solely through the destruction of the enemy's sources of strength."[21]

The Air Corps Tactical School

Another extremely influential body in the area of targeting theory was the Air Corps Tactical School (ACTS), located at Maxwell AFB, Alabama, in the early to mid-thirties.[22] For a number of reasons, the ACTS became the focal point for the development of the Air Corps' strategic doctrine prior to and through World War II.[23] "The school claimed that airpower could break down the enemy's 'will to resist' and 'capability to fight' by (1) destroying organic industrial systems in the enemy interior that provided for the enemy's armed forces in the field; (2) paralyzing the organic industrial, economic, and civic systems that maintained the life of the enemy nation itself. . . ; [and] (3) attacking the people themselves, especially those concentrated in the cities."[24] It should be mentioned that the school considered the third method—attacking people in cities—to be an "undesirable stratagem," for use only as a last resort.

Attacks on the population, the ACTS opined, resulted in only temporary effects that were not necessarily cumulative. "Furthermore, aside from the psychological effects on the workers, this attack does not directly injure the war-making capacity of the nation."[25] As a result, the ACTS advocated direct attacks on the enemy's national economic structure for the purpose of "reducing the capacity for war of the hostile nation, and of applying pressure to the population both at the same time and with equal efficiency and effectiveness."[26] Their rationale went something like this: Any nation that wants to fight a modern war will require a highly organized and smoothly functioning economic system. The demands of modern war place an enormous load on an economic system, making it that much more susceptible to serious interruption by attack. Furthermore, much of industry is interlinked as far as parts, raw materials, and processing are concerned, and virtually all of it relies on electrical power for production. Given this, it should be possible to determine

the vital links in the chain which if attacked would cause the breakdown or collapse of that economic system.[27] In the eyes of the ACTS, this should be airpower's primary objective, "In fact, it is the opinion of the school that this is the maximum contribution of which an air force is capable towards the attainment of the ultimate aim in war."[28]

The Industrial Web Theory. ACTS Majs (Robert M.?) Webster and Muir S. Fairchild, later Air Force generals, did research on the United States' industrial structure. The question they dealt with, in their much celebrated industrial web or fabric theory of war, was: How does one intelligently select suitable targets? Within the radius of bombers are hundreds of economic targets of greater and lesser importance; which ones should we strike? They began by assuming that other great nations were not unlike our own. An analysis of American industry should lead to sound conclusions about German, Japanese, or any other country's industry. The idea occurred simply enough when they discovered most of America's shoes came from one location in the United States. This led to another startling discovery: "We discovered one day that we were taking delivery on new airplanes, flying them to their points of reception, removing the propellers, shipping the propellers back to the factories, and ferrying out additional airplanes."[29] It turned out that there was no shortage of propellers, but a highly specialized spring was lacking. All of the springs made for all the controllable pitch propellers of that variety in the United States came from one plant, and that plant (in Pittsburgh) had suffered a flood. For "all intents and purposes a very large portion of the entire aircraft industry in the United States had been nullified by the loss of one small plant in one locality. The airplanes were grounded just as effectively as if a great many airplanes had individually been shot up or a considerable number of factories had been hit. . . . The classic example of this type of specialization, and hence, vulnerability, literally fell into our laps."[30] This discovery established the pattern for searching out the ideal selection of targets for precision attack by strategic bombers.

There is perhaps no clearer statement of the ideas of the ACTS than those found in AAF Training Circular Number 70, dated 16 December 1941. Although what follows is a rather lengthy quotation, it stresses concepts such as the importance of intelligence to determine vital targets and the interaction of individual target sets.

> Operations beyond the sphere of influence of surface forces are conducted to destroy systems of objectives which are vital to the will or ability of the hostile nation to wage war. These operations must be concentrated upon the most immediately vital one of such systems of objectives the destruction of which is within the capacity of the air force available, and these operations must be continued to a decision.
>
> The selected system of objectives may be the armed forces, a particular industry, or the means of providing an essential product or material. The system of objectives which is most immediately vital and is also vulnerable can be determined only after a most careful analysis of the hostile national structure. Further detailed analysis of the selected system of objectives is necessary to determine the particular targets the destruction of which will have the greatest effect upon the selected system of objectives.

> For example, analysis of a hostile structure may disclose the oil industry as the most immediately vital system of objectives but relatively invulnerable due to some factor such as very broad dispersion. On the other hand, electric power might be also vital but of lesser immediate importance and might be considerably easier to destroy by air attack due to its concentration in a few large and relatively fragile establishments.
>
> In any event the proper selections of systems of objectives and of targets requires the assembling of extensive data and detailed research which may extend over a considerable period of time, all of which demands such activities be continuously pursued in peace or war.[31]

Curtis LeMay

No discussion of this sort would be complete without mentioning the targeting ideas of Gen Curtis LeMay, an airpower and strategic bombing advocate. Although primarily concerned with nuclear warfare, he espoused a program of strategic attack that was strikingly similar to those he learned in the ACTS. In a 1951 speech to the USAF's Air War College, LeMay defined strategic air warfare as "air combat and supporting operations design[ed] to effect the systematic application of force to a selective series of vital targets, aggressive destruction and disintegration of the enemy war-making capacity to a point where it no longer retains the ability or the will to wage war." LeMay envisioned these "vital targets" as the enemy's "manufacturing systems, sources of raw material, critical material, stockpile, power systems, transportation system, communication facilities, concentration of uncommitted elements of the enemy armed forces, agricultural areas." Much as the ACTS had thought some 20 years before, LeMay saw the primary mission of strategic forces as attacks "against the economic heart of the [enemy] nation."[32] LeMay had learned his lessons well.

Summary

So far, we have seen a number of attempts at defining what constitutes (as Douhet called them) a nation's vital centers. It seems that they are all, in fact, attempts to arrive at the same end; that is, a determination of the most critical targets whose destruction will ensure the enemy's downfall. Of interest is that few theorists seem to agree that an attack on any *one* particular target will be successful in and of itself (such a target would be a Clausewitzian center of gravity in the truest sense). Rather, we find differing rationales as to suggested target sets, with the belief that their destruction, in combination with the stress/destruction imposed on other key elements, will result in success.

All of this leads to one particularly sticky point, the interrelationships of these important targets. Clausewitz does brush upon this idea in his discussion of alliances, and Warden's later writings indicate a growing appreciation.

But most theorists seem to view key/vital targets in strictly static terms.[33] They do not address the idea of shifting or changing centers of gravity, which conveys the notion of key centers of an enemy's strength replacing or compensating for each other as might occur in a democracy when there is an unpredicted change in leadership. Perhaps part of the problem is in the conceptualization of what constitutes these vital centers or centers of gravity.

The general concept of a center of gravity is widely embraced, but its intricacies are not well understood.[34] In chapter 3, the center of gravity of an object was defined as "a point at which all of the object's weight may be conceived as being concentrated."[35] This seems clear for an inanimate object like a bowling ball, but what happens when you group a bunch of bowling balls together, each with its own center of gravity? What is the new center of gravity of this collection? Now take a bowling alley consisting of many bowling balls of different sizes and weights; where is the center of gravity? If this example seems too childish, let's consider something more complex.

Every country consists of many separate but interrelated components. There are the rulers, people, economy, military, trading partners, and many other components. It would also be reasonable to state that a nation is as strong as the sum of these components. If all of the components are strong, as in the United States, you have a superpower. If only several are strong, you have something less. Does each component have to be strong? Certainly not. A weak economy can be compensated for by its leaders, its people, or its military, as was the case in the former Soviet Union. Likewise, a weak (or nonexistent) military, as in Japan, can be compensated for by the influence of a strong economy. Given this interplay between a nation's elements, is it plausible that force applied to any single point is enough to force the country to fold? This appears to be unlikely. Rather, the enemy's strengths are more apt to be invested across a number of key targets, all of which are critical to continuing the conflict. This is where the confusion occurs in thinking about centers of gravity.

How can you have more than one key target and still find a center? The term itself appears to imply, as Clausewitz may have intended, that only a *single* such target really exists, but this is probably the exception and not the rule. More often than not it would seem the enemy's strength—displayed in his ability—will, or desire, to continue the fight is spread out among several key elements and these are interrelated. Understanding the association between societal elements is important if we are to be able to effectively target a country. The Clausewitzian view of a center of gravity, not unlike Warden's strategic rings, is predominantly a static representation. Both search for *the* point at which applied effort will have the greatest impact. If Clausewitz were alive today, he would probably contend that his theory was dynamic; unfortunately, there is enough contradictory material in his unfinished work to argue either way.

In the next chapter, we propose an alternate way of looking at strategic targeting with an eye towards its applicability to strategic paralysis.

Notes

1. Air Commodore Jasjit Singh, *Air Power in Modern Warfare* (New Delhi: Lancer International, 1985), xxxiii.

2. Lest I be considered a troublemaker by Air Force targeteers for daring to reevaluate the issue, may I remind them of the statement in their own manual which encourages such activity: "The application of airpower cannot be mastered simply by learning existing techniques and procedures. Targeting is continuously evolving. While the historical lessons of the past remain useful as 'rough guides,' today's targeting officer must anticipate the nature of conflict and the evolution of advanced capabilities." Air Force Pamphlet 200-17, *An Introduction to Air Force Targeting,* 11 October 1978, 7-2.

3. What follows is by no means an exhaustive summary of the many targeting theories available to the researcher. For example, the dedicated researcher can go all the way back to World War I when a study on airplane bomb damage in Germany concluded that: "Strategic bombing should give first priority to [the] systematic identification and destruction of war industries vital to the war-making capabilities of the enemy." As quoted in Thomas A. Fabyanic, *Strategic Air Attack in the United States Air Force: A Case Study* (Kansas State University: Military Affairs/Aerospace Historian Publishing, 1977), 14.

4. Sea power advocates Gray and Barnett also concur with this notion: "Sea powers and land powers throughout history have had great difficulty in reaching the enemy's center of strategic gravity for the purpose of forcing a favorable decision." Colin S. Gray and Roger W. Barnett, ed., *Seapower and Strategy* (Annapolis: Tri-Service Press, 1989), xii.

5. K. A. Bratt and G. B. R. Sergei, "Aerial Weapons and Future Wars," in *What Would be the Character of a New War? Enquiry by the Inter-parliamentary Union* (London: P. S. King and Son, Ltd., 1931), 77. The Interparliamentary Union was (is?) a long-standing forum composed of political men representing 40 parliamentary governments worldwide who came together to study issues relating to world affairs. This particular collection of reports was assembled for distribution before the General Disarmament Conference to be held in 1931 in Geneva under the auspices of the League of Nations, Preface.

6. Ibid., 89.

7. Francis Delaisi, "International Ramifications of War Industry," *Interparliamentary Union Report,* 185.

8. Andre Mayer, "Protection and Defence Against the New Methods of Warfare," B, *Interparliamentary Union Report,* 226.

9. Ibid.; Alexander P. de Seversky, an airpower advocate and airplane designer of considerable influence, essentially agreed with the union's assessment: "When the skies over the nation are captured, everything below lies at the mercy of the enemy's air weapons. . . . We cannot and must not dream of conquering the enemy without first capturing dominance in the air; but once we have clear-cut dominance in the air, all else becomes a secondary subordinate, auxiliary operation." (Emphasis in original.) Maj Alexander P. de Seversky, *Victory Through Air Power* (New York: Simon and Schuster, 1942), 104 and 126. De Seversky was an assistant to Billy Mitchell for a while. His book was written during World War II and was intended to directly challenge what he saw as America's ineffectual use of the air weapon.

10. To be fair, I doubt Colonel Warden really sees the world in such a neat package. In fact, in his most recent work, he perceptively expresses the dynamic relationships involved: "The concept of centers of gravity is simple in concept and difficult in execution because of the likelihood that more than one center will exist at any time, and that each center will have an effect of some kind on the others." John A. Warden III, "Employing Air Power in the Twenty-first Century," 1991, TMs [photocopy], draft manuscript, 5.

11. Ibid., 9.

12. While this may seem simple and straightforward enough, one can argue that there are situations where destroying the command element is neither realistic, practical, nor desirable. This idea is dealt with more fully later when we look at the leadership element in chapter 5.

13. Lee B. Kennett, *The First Air War, 1914–1918* (New York: The Free Press, 1991), 44.

14. Haywood S. Hansell, Jr., *The Strategic Air War against Germany and Japan* (Washington, D.C.: Government Printing Office, 1986), 4.

15. Air Commodore L. E. O. Charlton, *War from the Air* (New York: Thomas Nelson and Sons, Ltd., 1935), 171.

16. Ibid.

17. Lord Tedder, *Air Power in War: The Les Knowles Lectures by Marshal of the Royal Air Force* (London: Hodder and Stoughton, 1947), 97–98.

18. M. J. Bernard Davy, *Air Power and Civilization* (London: George Allen & Unwin Ltd., 1941), 139; see also General der Flieger a.D. Paul Deichmann, "The System of Target Selection Applied by the German Air Force in World War II," USAF Historical Studies No. 186, 1956, 3.

19. Williamson Murray, *Strategy for Defeat of the Luftwaffe, 1933–1945* (Maxwell AFB Ala.: Air University Press, January 1983), 7.

20. Richard Suchenwirth, "The Development of the German Air Force, 1919–1939," ed. Harry R. Fletcher, USAF Historical Studies No. 160, Aerospace Studies Institute, Air University, 1968, 168–69.

21. Ibid., 169. Unfortunately, too few original documents remain on GAF doctrine for us to get a better picture of why the GAF tended to shy away from heavy bombers and what they could do (in spite of some strong advocates like Army General Wever). This is most likely a result of several factors: (1) Wever died early, leaving few strategic bombing advocates; (2) GAF saw as the lesson of World War I that the bomber would be very vulnerable to attack by fighters unless escorted; (3) Germany went to war to get territory and to absorb the resources and capabilities of their neighbors. Destroying them by strategic bombing did not seem to fit in with this idea. Strategic bombing might have made more sense had they foreseen war with Great Britain, but Germany had no plans to attack Great Britain (early). The GAF surveyed the threat from France, Poland, etc., and decided there was not a realistic threat from strategic bombers to the homeland—how or why this translated into "we don't need them either" is up for speculation; (4) technology was wanting. Germany could build good airframes but not the engines they needed for the bigger bomb loads. They also couldn't manufacture the high-quality aviation gas in the quantities needed; and (5) the GAF thought strategic bombing would merely promote a war of attrition, which they could not win. They needed quick decisive victories, not long drawn-out affairs. Ibid.; I am indebted to Dr Jim Corum, a Luftwaffe expert with the School of Advanced Airpower Studies, Maxwell AFB, Ala., for many of these facts.

22. Virtually all future AAF leaders, except Arnold and Doolittle (who was a reservist), attended ACTS. For example, Ira C. Eaker, Carl Spaatz, Curtis E. LeMay, Haywood S. Hansell, and Claire E. Chennault, to name a few.

23. After World War I the military suffered a huge loss in experienced personnel. The seasoned aviators left, and there weren't many who found their way to the smaller staffs and the Air Corps Tactical School. As it turned out the ACTS became the key source of ideas for the Air Corps, serving as the need arose in developing air doctrine. For example, in 1935 Gen Oscar Westover tasked the Air Staff with developing a uniform doctrine for the Air Corps. But because the Air Staff never had more than five action officers assigned to it, it deferred the task to the ACTS. Westover's staff ended up adopting nearly word for word the school's inputs, many of which came directly from ACTS manuals and texts. See Robert F. Futrell, *Ideas, Concepts, Doctrine: Basic Thinking in the United States Air Force, 1907–1960,* vol. 1 (Maxwell AFB, Ala.: Air University Press, 1989), 62–77.

24. Hansell, *The Strategic Air War,* 11; see also Maj Muir S. Fairchild, "National Economic Structure," Lecture No. AF-9 and 10-C, ACTS, 5 April 1938. In the USAF Historical Research Agency, Document No. 248.2019A-10, 3.

25. Fairchild, 3 and 5.

26. Ibid., 5.

27. The ACTS is not without its critics. Hansell was critical of the way the Air Corps tended to magnify its capabilities and minimize its limitations in the way they built their 1935

doctrine around drawing board designs and theory: "In this atmosphere of theory, the Tactical School [i.e., the ACTS] developed a syllogism upon which the entire structure of air doctrine was dependent. That syllogism might be described in general terms as follows: 1. First Premise: Modern nations cannot wage war if their industries are destroyed; 2. Second Premise: Aircraft can penetrate any known air defenses and destroy any known target with bombs; 3. Conclusion: Air warfare is therefore a method of destroying the enemy's ability to wage war. It is primarily a means of striking a major blow toward winning war, rather than a direct auxiliary to surface warfare. . . . Unquestionably this [Air Corps doctrine] was based on hope and not on existing fact." He goes on to state: "I believe there is little doubt about the dependence of nations on industry; or that bombs in sufficient quantity and size can destroy industrial structures." Brig Gen Haywood S. Hansell, "The Development of the United States Concept of Bombardment Operations," speech given to the Air War College, Air University, Maxwell AFB, Ala., 19 September 1951, 1–7; more recently, Col Barry Watts showed his criticism: "The tendency in ACTS' thinking to view war as fundamentally an engineering science is so obvious and so pronounced as to require no further explanation." Is war more art than science, or more science than art? If you think the former as Watts does, then the ACTS failed to consider friction in all its plans. Watts makes a compelling argument in his study that the bombing theories of the ACTS and early theorists were flawed because they did not take friction into account. They should have been able to foresee that the bomber might not get through because of fighters and flak. Watts goes on to say: "The sine qua non of a successful military organization is the capacity to adapt to changing conditions better than the enemy." Barry D. Watts, *The Foundations of US Air Doctrine: The Problem of Friction in War* (Maxwell AFB, Ala.: Air University Press, December 1984), 23, 47.

28. Ibid., 9–10.

29. Hansell, "The Development of the United States Concept of Bombardment Operations," 10–12.

30. Ibid. The springs' counterpart in Germany was the ball bearing industry. It was thought that 50 percent of the bearings used in German tanks and trucks were produced in Germany.

31. *United States War Department Training Circulars,* vol. 1, *1940–1941,* Training Circular No. 70, *Army Air Forces Basic Doctrine,* War Department, Washington, D.C., 16 December 1941, 6.

32. Lt Gen Curtis E. LeMay, "Tactics of Strategic Bombing," speech given to the Air War College, Air University, Maxwell AFB, Ala., 28 March 1951.

33. On balance, Clausewitz may have actually thought of centers of gravity in more dynamic terms than we give him credit for. How else can one explain his exception of going after secondary targets when they looked "exceptionally rewarding," versus always hitting the center of gravity, *unless* by hitting these secondary targets (or lesser centers of gravity) one could affect the primary center?

34. AFM 1-1, *Basic Doctrine of the United States Air Force,* vol. 2, March 1992, 275–76, gives two other (not from Clausewitz) definitions, for the term center of gravity: (1) Joint Test Pub 3-0: "that characteristic, capability, or locality from which a force derives its freedom of action, physical strength, or will to fight. It exists at the strategic, operational, and tactical levels of war." (2) US Army FM 100-5, May 1986: "The sources of strength and balance from which a military force derives its freedom of action, physical strength, or will to fight. It may be the mass of the enemy force, the seam between two of its major force elements, a vital command and control center, its logistical base, its line of communications, or something more abstract, such as military cohesion, morale, or the national will."

35. Academic American Encyclopedia. Prodigy Computer Network, Grolier Electronic Publishing Inc., 1991. *Webster's* echoes this, defining a center of gravity as "the point through which the resultant of gravitational forces on a body passes and from which the resultant force of attraction of the body on other bodies emanates: coincident with the center of mass in a uniform gravitational field." *Webster's Encyclopedic Unabridged Dictionary of the English Language* (New York: Portland House, 1989), 239.

Chapter 5

The National Elements of Value Model

There are no panaceas, no magic targets that defeat the enemy simply, no single "Achilles Heel" that, if struck, will cause the enemy to crumble immediately. There are no easy solutions to the targeting problems of today; nor will the problems of the future be easier to resolve.

Air Force Pamphlet 200-17
11 October 1978

There is little agreement in defining the most effective targets and their interrelationships. This chapter proposes another way of looking at the problem of target selection as it applies to the air strategy of strategic paralysis. Selecting the best targets for attack, remember, is a key premise in the effective use of the strategy. The national elements of value (NEV) dynamic targeting model is such an approach.[1] The model describes seven strategic target categories or elements and makes the following four assertions: (1) NEVs very in importance from country to country; (2) NEVs are self-compensating; (3) NEVs must be evaluated (or appreciated) by rational heads of state if they are to be of value; and (4) proper identification of an enemy's NEVs requires a significant increase in the intelligence base.

Instruments of National Power

The contradictions and problems that permeate existing targeting theories make trying to find a better one worthwhile. From the presentation thus far, it follows that the ideal objective for air attack is a vulnerable vital element of the enemy national structure that consists of a few individual targets.

Every country enjoys at least four instruments of national power or influence: political, economic, military, and informational. (In some writings, the *informational* instrument of power is replaced or complemented by *social* and *psychological* mechanisms.[2]) The simple fact that all countries are endowed to a greater or lesser degree with these instruments does not mean they are effective in projecting power. A country can only exert influence when its (collective) instruments are more powerful than those of the country being influenced. It follows then, that some of these four are also their sources of strength. An understanding of this is helpful if we are to determine a list of national strategic targets applicable for any country.

A Country's Sources of Strength

From a military viewpoint, identifying the important targets within a country's instruments of national power should be the same as determining where that nation draws its strength to continue the fight. Most of the legwork for such a study has already been done. A breakdown of the suggested target sets proposed thus far (fig. 5) reveals the following seven broad categories:

1. Leadership
2. Industry
3. Armed Forces
4. Population
5. Transportation
6. Communications
7. Alliances

There appears to be wide agreement with the selection of these seven categories as representative of most, if not all, of the vital elements of any country. This listing of elements is important for two reasons: it delineates a country's sources of strength, and it identifies the target sets necessary for defeating that country. Additionally, these categories represent most of the elements necessary for any country to exist as a sovereign power. They are also subsets of the four instruments of power.[3]

Political	*Economic*	*Military*	*Information*
Leadership Alliances	Industry Transportation	Armed Forces	Population Communications

Collectively, these seven are referred to as a country's *national elements of value.*

NEVs Further Defined

Every country has these seven national elements of value. A detailed discussion of each element follows.

Leadership. Leadership is defined as the political and military decision makers within government. This could be a president, a family, a dictator, a peoples committee, a revolutionary junta. Those who are in control of the people, the government, and the military are of interest. Leadership is a key feature in every nation. Whether it resides in a single person, like a dictator, or in a body of people, like the now defunct Politburo of the USSR, it remains a significant element to attack.

> If conquering the enemy's will to resist is the final aim of war, it would appear advisable to determine a more precise definition of this objective. In a strictly realistic sense the will to resist is based on the conviction that the consequences of

Figure 5 *Seven National Elements of Value*

	Leadership	Industry	Armed Forces	Population	Transportation	Communication	Alliances
Clausewitz	Personality of Leaders		Fighting Forces	Capital City; Community of Interest			Alliances
Jomini	Seats of Power		Armed Forces	Capitals	Lines of Communication	Lines of Communication	
Douhet	(As Affected by Attacks on Population)	Concentrated Industries; Hydraulic Resources	Enemy Air Forces; Military storage areas	Morale of People; Large Population Centers	Railroad Junctions and Depots	Communication Lines	
Mitchell		Manufactories; Food Products, Farms and Centers of Production	War Effort	Places Where People Live and Carry on Their Daily Lives	Fuel and Oil	Means of Communication	
Air Corps Tactical School	Center of Empire; Capital	Munitions and Aircraft Industry; Ship Building; Petroleum; Sources of Power	Armed Forces	Food Stuffs; Shelter; Clothing; Public Utilites	Roads and Highways; Railing Transportation; Shipping; SLOCs		Imports
Luftwaffe	Centers of Government Administration	Manufacturing Industries; Electricity Supplier	Military Replacement Centers	Food Supplies and Food Sources	Rail and Road Routes		Import Activities
Liddell Hart	Capital as Heart of its Life; Seat of Opposing Will and Policy; Government	Key Manufacturing; Essential Mining		People	Arteries		Overseas Trade
Warden	Command	Essential Production	Military Forces	Population	Transportation Network		

Notes:

A strict categorization is impossible because many of the items overlap.
This serves as only a rough approximation of the targets sets contained in these ideas.
Most of the entries are taken directly from the words of the author.

> **further resistance will be more desirable than the consequences of ceasing to resist. It is assumed that this desire lies primarily in the minds of a nation's leaders who, of course, are influenced by the resistance of the people and of the armed forces. This relationship depends in part upon the structure of the nation and on its racial geographic and economic unity.[4]**

Colonel John Warden argues persuasively that the command or leadership element is the most important target or center of gravity of most countries. He may be right. It is certain that command is a necessary requirement of every endeavor. Unfortunately, it is not so simple. The issue of succession, dependency, and power transfer must be addressed.[5]

In Desert Storm, few would argue that if Saddam Hussein had been killed, the war might have ended. Hussein was a brutal dictator who kept his people

in line and himself in power by violence and intimidation. He appeared to be Iraq's most important national element of value, which might explain why he was protected so thoroughly. If, however, President Bush had been killed during the war, the war efforts would not have ceased. The difference lies in the US political system and its accepted means of succession. Succession to political power in the US is clearly outlined. The point is that the leadership NEV cannot arbitrarily or automatically be assigned as the most important target or center of gravity. That determination depends on the type of government, the process of succession to power, and how indispensable leadership is to the conduct of the war.

In some instances, it may not be advantageous to kill the leadership. This argument surfaces in discussions of nuclear weapons, but it applies equally here. Terminating the conflict at some level short of complete annihilation usually involves sparing someone to speak for society. This was one reason why the Japanese emperor was not targeted in World War II. If Saddam Hussein had been killed early in the air campaign, who would have stepped forward to either carry on or sue for peace? It is important to think through the war aims or end-states desired before the first short is fired.[6] Thomas C. Schelling, for example, argues that "The survival of the loser's authority structure [is] a necessary condition for the orderly surrender of his remaining forces."[7] This argument, however, creates a dilemma for an attacker who sees that same authority structure as an impediment to peace.

Another issue faced in targeting the enemy's leadership is how much to take off the top. The answer to this question requires a good understanding of the enemy's leaders and governmental processes. It does little good to leave a successor who will carry on the fight. On the other hand, whoever is left must not be of such low stature as to be unable to speak for the country. It may even be possible, in the precision conflicts of the future, to avoid targeting the leaders thought to be most sympathetic. This, of course, requires significant levels of intelligence and cooperation.

Industry. Industry includes all of a country's manufacturing, agriculture, and technical enterprises as well as those parts necessary to support them, such as power production, water supply, and raw materials. Most wars require a bounty of equipment and supplies: guns, ammunition, clothing, food, and jet fuel to name a few. This equipment can be manufactured in-country or imported. Moreover, modern military equipment is very expensive. An F-15E costs $46.4 million, and M1-A1 Abram's tank $2.8 million, and an aircraft carrier $3.2 billion. One way to reduce costs is to concentrate industrial resources. An unfortunate by-product of concentrating industry, however, is increased vulnerability.[8] For example, the assembly line for the B-2 stealth bomber is housed under a single roof covering many thousands of square feet—an easy target from the air. As technology increases, it is likely that the exotic processes required to produce advances in composite materials, synthetic radars, lasers, and the like, will become even more centralized and dependent on single sources in an effort to save money. The sole source for an incredibly purified product used in the testing and manufacture of a certain

United States military jet engine comes from one installation. If that building were knocked out, engine production, replacement, and testing could be delayed for up to one year.[9]

If attacks on industry are not carefully aligned with the strategy and aims of the conflict, one risks wasting effort.[10] It makes little sense to attack a country's long-term industrial base (say, for instance, the ball bearing industry) if it is known that the enemy has stockpiled a six-month supply and a short war is anticipated. (This does not rule out the punitive nature an air campaign might assume, given the nature and duration of the threat.) On the other hand, electrical power (regardless of how it is produced) is an element common to all industry. Virtually no modern society can operate without it. This might make it a good industrial target if short-term results are all that is necessary. However, in section 20 of an ACTS report entitled "Japan as an Objective for Air Attack," Capt Thomas D. White concluded:

> To say that the destruction of Japan's power sources would be a death blow to the nation is too obvious for comment. Such a statement applies with equal force to any modern nation. To deduce however that a nation depends on industrial power for at least 70% by value of its total industrial production is highly significant and unquestionably uncovers a highly sensitive spot in the national structure.[11]

In addition, the precision of modern airpower allows for selectivity within the target set so as to minimize long-term damage. It is therefore logical that Iraq's electrical power generating and supply sources were the subject of precision attacks from the outset of war.[12]

Armed Forces. A third NEV is simply the military force a country has at its disposal. These include the army, navy, air force, marines, strategic air defenses, ASAT systems, coast guard, revolutionary brigade, terrorist units, and peoples armies. It might seem unusual that in a discussion of military targeting, the enemy's armed forces are not at the top of the list. Keep in mind, however, that the armed forces are rarely the true or final objective in war; the enemy's will occupies that position. If we can convince an enemy to comply, or change his conduct, short of resorting to military force, this is usually the preferred option. The military, then, is just another element of national power—it may not be the principal NEV.

Targeting an opponent's armed forces can produce benefits at several levels. For most countries, the psychological impact of destroying their army (or perhaps their air force) might be sufficient to cause capitulation. But that approach might require a massive effort and result in huge casualties. In most situations, however, some form of attack on the enemy's armed forces will be necessary if for no other reason than to gain the aerospace control necessary to begin a campaign of strategic paralysis. Direct attacks may also be needed to stop an advance and pin the military down, especially when friendly territory is at stake. However, once the immediate threat is gone (and in the absence of some other motive), strikes at the enemy's other NEVs seem justified. It is logical to expend effort where it will contribute most toward changing his behavior while keeping exposure and casualties to a minimum.

The Population. This NEV may be the most important source of strength a country has, and it is the hardest to impact. The population embraces all of the ubiquitous features of a country that are important but hard to categorize and quantify. These include nationalism, morale, will of the people, ethnocentrism, the ability to endure hardship, esprit de corps, and religious conviction or fervor. Many theorists, such as Douhet and Sir Arthur "Bomber" Harris, believed that the population was really the ultimate target, thinking that if there was no change in this element there could never be any lasting peace. After all, it is the population and not the leadership that does most of the fighting, suffering, and dying in any conflict. So, in theory at least, the ultimate power lies within the population. Isolating the population from the leadership is one thing; it is quite another to influence the people to turn against their leaders.

The population's support for its government and its resiliency to endure hardship depend in part on what is at stake, who started the conflict, and the level of commitment or resolve on each side. If one's country and way of life are at risk, resolve will be high. If, however, territorial acquisition is the only matter in question, the tolerance for suffering may be low. These are the types of sticky morale questions that make war more art than science. It goes without saying that attacking the will of the people is difficult and risky; nevertheless, it is a proven element of value.

Transportation. The fifth NEV includes ground, air, and sea transportation modes. A war cannot be fought unless forces can be put in contact with the enemy and then sustained. This requires transportation. Some or all of the components in the transportation element may be highly vulnerable. Examples include bridges, rail yards, airports, docks, and sub pens. As previously noted, the attack on Germany's transportation network, in particular its rail lines and waterways in World War II, significantly impacted the war effort.[13] Transportation is related to all of the other NEVs, too. Without transportation, industry cannot move equipment and supplies, and leadership cannot plan, execute, or move critical units.

Communications. The sixth NEV, consists not so much of the message but rather the *means* by which the message is communicated. Communication targets include radio stations, telephone wires, microwave antennas, satellites and their associated up-link and down-link stations, and fiber optic cables. Every leader must be able to communicate with his forces if he is to wage war successfully. Napoléon used riders on horseback; Schwarzkopf had satellites. Their need to communicate with their troops in a timely manner was the same. As countries become more and more dependent on higher technology to communicate, these elements will become increasingly valuable targets. By most measurements, a command element denied the ability to communicate is useless. Communications may therefore be the principal NEV to attack, depending on the situation. Witness Desert Storm when, at the outset, all of

Saddam's known communication links, such as his telephone switching centers and his radio, satellite, and microwave antennas, were immediately attacked. However, it seems that he had what amounted to a triple or quadruple backup system in a fiber optic network that went undetected. When that was destroyed, the Iraqi system was stressed even more—but it did not collapse because the command element compensated with personal and messenger visits to the front.

The US military has always prided itself on initiative and flexibility. Army commanders issue what is known as their "commanders intent." These are generalized instructions for each unit as to what outcome they should achieve and how their effort fits into the overall plan. This is done, among other reasons, to compensate for a loss of communications. In other words, a country properly motivated and having the necessary long-range planning, could continue a conflict indefinitely with severed communications, even if that meant resorting to unconventional warfare.

It may be counterproductive to completely destroy an enemy's communication system; he may wish to communicate an end to the conflict at some point. And it might be impossible to sever an enemy's communication links with his own forces or countrymen while leaving him an open channel to the outside. Therefore, in strategic paralysis warfare it may be advantageous to retain the ability to communicate with the enemy. This is especially important when communicating the reasons for your actions—and the promise of futures ones—is desired.

Alliances. This NEV comprises the friends, allies, trading partners, and neighbors from which a country receives support for continuing the conflict.[14] In general, alliances are reciprocal strategic relationships between countries. From such alliances, the enemy nation receives equipment, personnel, or war-making supplies.[15] Another no less important type of alliance support, though difficult to quantify, is moral support. Jordan and Iran's support of Iraq during Desert Storm was invaluable to Saddam Hussein in legitimizing the war to his people and obtaining critical Arab support. It is important to realize that no modern country is self-sufficient. Every nation is reliant on others for commodities and resources. If an enemy's trading partner can be made to stop delivery of critical supplies, it will stress the enemy. The important issues are whether these relationships are susceptible to interruption and what means should be chosen (and at what costs) to interrupt them.

Four Assumptions

As with any theory, there are some assumptions or prerequisites that are necessary in understanding and using NEVs: (1) NEVs are interdependent and self-compensating; (2) their importance will vary with each country; (3)

the government will make rational decisions concerning its NEVs; and (4) we have the necessary intelligence to carry out the campaign. Each of these will now be explained in greater detail.

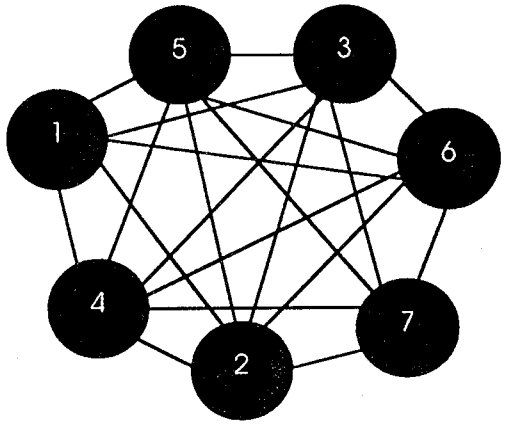
Interdependence and Self-compensation

The first and perhaps most important assumption in applying and understanding NEVs is that they are interdependent and can compensate for each other. One problem with the historical view of airpower targeting theory is the notion that destruction of individual targets or target sets can bring down entire countries. But while such situations can be imagined, this premise generally has no basis in historical fact. A more realistic approach to targeting, then, would be to assume some sort of interaction between target elements within a country (fig. 6).

Figure 6
Interrelationships of
National Elements of Value

Key:

1. Leadership
2. Industry
3. Armed Forces
4. Population
5. Transportation
6. Communication
7. Alliances



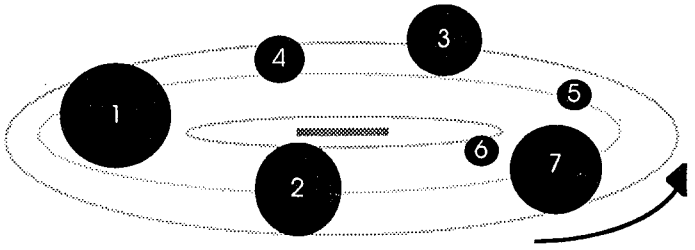
Yet, even this presentation does not adequately show the dynamic relationships that exist between most, if not all, NEVs. Figure 6 implies that all NEVs are of equal importance. Since this is not the case in most countries, the diagram needs to reflect the dynamic interaction of these elements, including the effects that attacks on individual elements will have on other elements and on the system as a whole.

Figure 7 represents an attempt to visually depict the interaction of the national elements of value as they exist in any nation-state system. Each NEV, though freed from a rigid structure of fixed relationships (as in fig. 6), is still heavily dependent on every other NEV for its own stability.

Figure 7
National Elements of Value
Reflecting Individual Importance and Dynamics

Key:

1. Leadership
2. Industry
3. Armed Forces
4. Population
5. Transportation
6. Communication
7. Alliances



The suggestion of motion has been introduced to represent the interaction and dynamic nature of the system, and each NEV has assumed a size relative to its particular importance in that country at the particular moment in time. The significance of this representation, though simplistic, is its dynamic structure. Though a single element might be more important at a given moment, it is still affected by the others; that is, it reacts to its environment. Figure 8 depicts the interconnectivity between NEVs.

The lines between the NEVs in figure 8 are constantly varying in size and texture as they represent the strength and direction of influence, both formal and informal, and the various lines of command, control, and authority that are inherent between these elements. The lines, in fact, constitute a portion of the communication element of value within that nation. If each element in

Figure 8
National Elements of Value
With Interlinking and Variable Lines of Influence

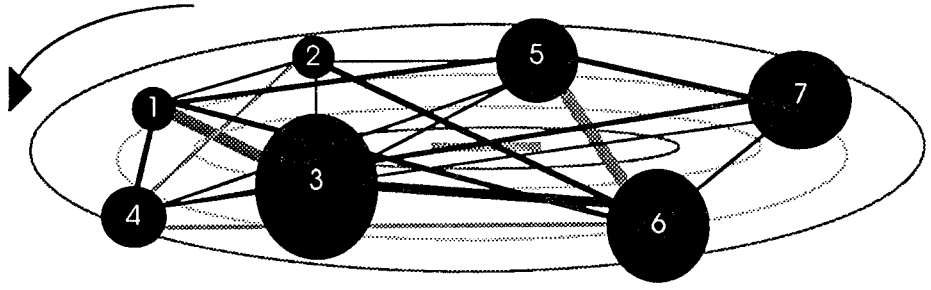
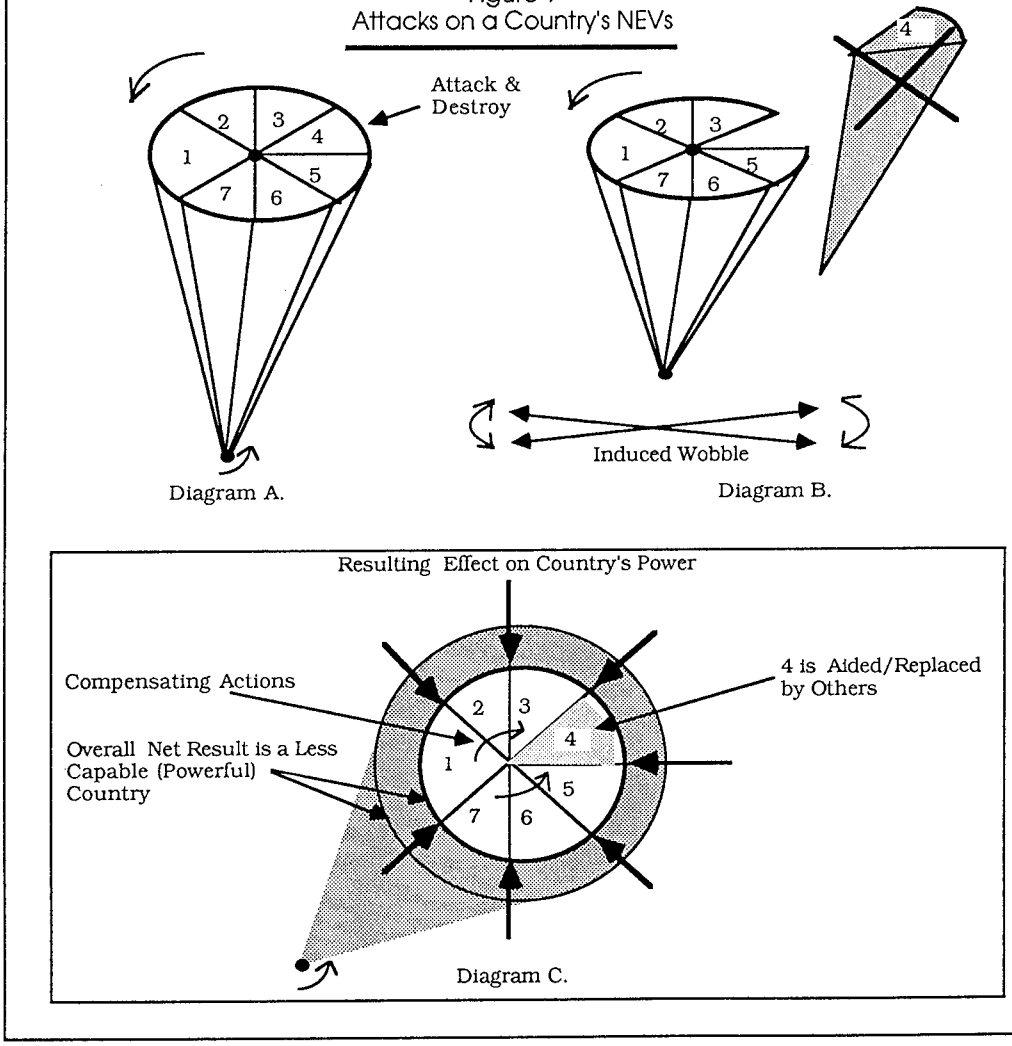


figure 8 represented a target or a set of targets, we can see that eliminating any one destabilizes every other one.

One could surmise from this diagram that the destruction of one target (or target set) could be enough to throw the system into such a wobble that it falls. Such a result, however, would depend on how quickly that particular NEV could be destroyed, how important it is, and how dependent the other NEVs are in relation to it. (In the model, the importance or influence of each NEV is shown by its size and position relative to the others.) For example, the transportation infrastructure, number 4 in the figure, is of only moderate importance. Yet all of the other elements depend on it for their survival and well being.[16]

Another popular—yet erroneous—way to visualize this idea is shown in diagrams A and B of figure 9. An enemy country might be thought of as a

Figure 9
Attacks on a Country's NEVs



spinning top with seven identifiable slices, one representing each NEV. This leads to the belief that if you can attack and destroy one complete slice, the whole structure will begin to wobble and fall over. This idea is represented in diagram B, in which the country's entire transportation element has been removed. This is a fairly straightforward, if naive, viewpoint. It seems unlikely that any one NEV could ever be destroyed so completely and suddenly as to cause the downfall of a country (unless, of course, everything hung on the importance of that one element; e.g., the personality of a single leader).

The magnitude of an effect depends on the size of each piece and the speed of its removal. (Obviously, a gradual removal will have a limited impact; the shock of a sudden removal will be greater.) More likely than not, the improbability of completely eliminating a single NEV in its entirety and the compensating tendencies of the other elements will help to lessen the impact of attack. In actuality, diagram C is a better representation of what happens when attacks are concentrated in one area. The surrounding areas simply slide in to replace what has been taken out. Instead of an entire collapse, one is left with a smaller, less capable whole. It seems that a better strategy might be to attack the whole, or at least the most significant pieces. Col Dennis M. Drew, professor of Military Strategy and Airpower Doctrine at the Air University, advocates a three-dimensional strategy for airwar: "Rather than seeking a few critical strategic targets, [this idea] . . . takes a holistic approach and attempts to collapse the entire enemy power structure almost simultaneously.[17]

The main ideas presented in these diagrams are those of replenishment and substitution. If on NEV is completely (or severely) crippled, it might be possible for another to take its place (i.e., increase in importance or size, reposition itself, etc.). This was certainly the case in the strategic bombing of Germany in World War II. Assuming that the destruction of the ball bearing industry would bring a halt to the German war machine, the allies attacked these targets despite significant losses. It was believed that this singular industry was Germany's key vulnerable component to the war effort. However, it is now known that Germany compensated for these losses by importing from Sweden and Switzerland and by dispersing the industry. Thus, the transportation and alliance NEVs compensated for the damage done to the ball bearing industry.

The concept of NEV replacement was examined in considerable detail in Mancur Olson's *The Economics of Wartime Shortage.* Although Olson was mainly concerned with a country's ability to compensate for the loss of agricultural products in war, his conclusions apply to nearly every aspect of a country's sources of strength. "A nation," Olson observed, "can be reallocating its productive resources substitute almost anything it would be willing to sacrifice for almost anything it lacks. It matters not whether the product is would sacrifice has anything in common with the product that is missing. And this indirect type of substitution, too, applies as much to shortages of primary products as to shortage of other things."[18] Olson is, in fact, supporting the notion that countries can subsidize or adjust for NEVs that are degraded in war.[19] He cites several reasons for the success of this compensating activity.

One reason is that excess production capacity or extra resources are often available in nearly every peacetime industry prior to the outbreak of hostilities. When faced with the stresses of war, these industries (he uses agriculture as an example) have little problem increasing their efforts to make up for shortages and losses throughout the system. "The significance of all of this is that the unnecessary labor and other resources in agriculture in peacetime provide an unplanned buffer against wartime shortages."[20] This buffer exists in the non-food sectors of the economy as well. Olson concludes his study by stating that "Modern economies, especially if they are intelligently administered, are more adaptable in the face of shortages than in often assumed."[21]

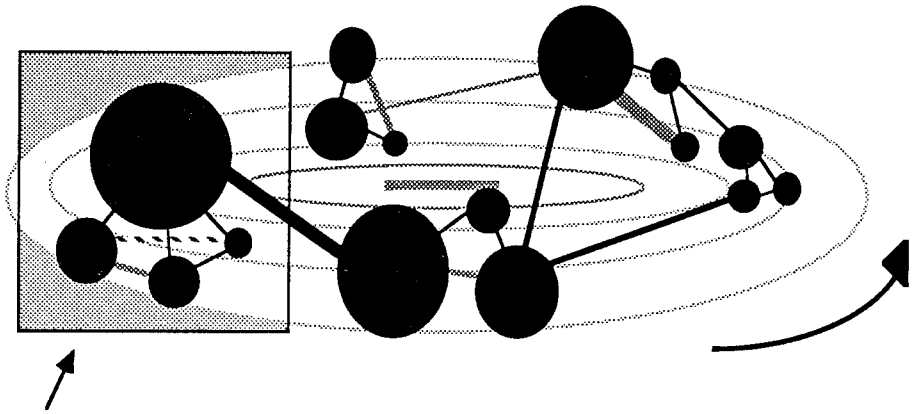
Importance Will Vary

The second assumption in understanding NEVs is that their importance varies from country to country and day to day. Thinking in terms of NEVs versus centers of gravity offers several benefits in ascertaining the key targets of any country. The first benefit is in understanding that no two countries will have the same strategic target sets. Their NEV depictions will not be alike. Additionally, if a country's NEVs can wax and wane in war, then the model is continually changing and is accurate only at the time of the "snapshot." Therefore, what might have been a critical target at the beginning of the war may not be critical later. If the elements within a nation can change in their importance, compensating for the weaknesses of others, then continual evaluation will be needed during the conflict to ascertain which elements are the most critical at a given time. (Keep in mind that the focus should not be on the targets (NEVs) themselves but on the desired effects. This is covered in more detail later, when end states are discussed.) Having looked at the interrelationships within and between a country's NEVs, attention now turns to the interplay between nation-state systems and their alliances.

If figure 8 represents the interlinking NEVs of a single nation-state, then figure 10 represents an alliance system. Note the interrelationships between not only the enemy's country and its allies but alliances between allies as well. The lines between countries represent such things as loan guarantees, trade, direct communication links, or shared values (such as religious, economic, and cultural ties). These lines of affiliation or connectivity are varied purposefully to show the diverse nature of international alliances. This is an obvious oversimplification, and one need only look at the Coalition in Desert Storm to appreciate the importance of understanding the value and vulnerabilities inherent in any alliance system.

NEVs—Every Country Has Them. NEVs are the same for every country. In other words, every country derives its strength from the same selection of sources. Thus, the NEVs for Athens in the Peloponnesian wars were the same as for Britain in World War II. However, and this is key, not every source or element carries the same weight or is equally vulnerable in all countries. The war-making industry in Hitler's Germany was much more important and

Figure 10
Enemy's Alliance Network



Representative of a Single Nation-State's
National Elements of Value
Connected in Alliance with Other Nation-States.

vulnerable than the industry of North Vietnam during the 1970s. It might, therefore, have been more fruitful in the latter instance to direct air strikes against another NEV, perhaps North Vietnam's alliance with the Soviet Union or china.

The mistake was in attempting to transpose the individualized NEVs of a highly industrialized Germany onto a mostly agrarian North Vietnam. The lesson is that while every country has the same NEVs, their relative importance changes, depending on the circumstances. This, in fact, was the view held by the Air Corps Tactical School in the late 1930s. In a lecture delivered at the school in April 1938, Maj Muir S. Fairchild stated:

> In fact, each nation differs from all other nations, not only in its *degree* of vulnerability to air attack, but also in the *kind* of vulnerability; that is to say in the *elements* of its national structure that are most vulnerable to this sort of an attack. One nation is weak and vulnerable in one respect and strong in another—while the exact opposite may be true of its neighbor.[22] (Emphasis in original.)

Attacking key industrial targets and electrical sources in Germany had more of an impact because Germany was much more dependent on industry than North Vietnam was. NEVs mirror each country's own international status in industrial, social, cultural, and political development because they comprise the very elements which convey such status.

A NEV need not be a physical object. For example, the will or morale of the population is a NEV, but this does not mean that it is easily targeted. Yet, there are ways in which the population can be affected. Even Clausewitz's centers of gravity could reside in the ether of public opinion.[23]

NEVs may also reside outside the geographical boundaries of the country in question. In other words, the focus of an alliance NEV may actually reside outside the state. During Desert Storm, America's alliance with Israel—and its effect on the Coalition—gave Saddam Hussein an important and vulnerable target. He directed the majority of his Scud missile attacks not at the Coalition, which was next door, but at Israel. Fortunately, for a number of reasons, he was unsuccessful in upsetting the Coalition. Had he succeeded, there is little doubt that the strategic outcome could have been quite different.

NEVs in Modern Societies. De Seversky observed nearly 50 years ago that "Total war from the air against an undeveloped country or region is well-nigh futile; it is one of the curious features of the most modern weapons that it is especially effective against the most modern types of civilization."[24] Intuitively, it would seem that the higher a country is on the industrial ladder, the more likely its NEVs will be vulnerable to airpower. The characteristics of a nation's infrastructure may be the key to this vulnerability. For example, transportation is a key element in any country's ability to sustain itself in combat. However, if the means of transporting men and materials is by foot and along jungle trails, it is difficult to attack effectively from the air. But give this same country modern transportation systems, rail, road, and air, and its vulnerability increases significantly. The same holds true for the communication NEV. Messages being carried by runner are far less susceptible to systematic air attack than are telephone lines, microwave towers, and satellites. This does not mean, however, that a modern society with a fixed and vulnerable communication or transportation system will collapse when portions of its infrastructure are destroyed. Far from it. Unless these events happen so quickly and completely that recovery is impossible, it is likely that their loss will be offset by another NEV.

Rational Decision Makers

The third assumption regarding NEVs is that the enemy makes decisions in a rational manner. This may be obvious, but it is very important if this strategy is to succeed. For strategic paralysis to work, the enemy must see and appreciate its own NEVs in essentially the same way as the attacker would. If he does not, then these differences in appreciation must be known.[25] One cannot influence an enemy who does not value life, limb, or property. If, as Air Commodore Jasjit Singh contends, "The aim of strategic airpower is [the] destruction, disruption and dislocation of the enemy war-waging machine in its totality so as to degrade the overall capabilities to wage war and/or increase the costs of waging war to an unacceptable level," then the enemy must value his "costs" and "unacceptable levels" in a way that is predictable or understandable.[26]

Value and Vulnerability. From the discussion of individual NEVs and their interplay on the others, a paradox seems to develop; this is the value to vulnerability factor. Warden defined centers of gravity as both the enemy's

most valuable *and* most vulnerable point.[27] However, it seems logical and even quite probable that the national element(s) a country draws its greatest strength(s) from are also those most likely to be highly protected, shielded, defended, hidden, or duplicated. Common sense suggests that if you cannot find something, you can't attack it; likewise, throwing all of your strength against all of the enemy's is unwise unless you have the advantage. So if direct assaults are not practical, can an element be affected even though it is not directly targeted? Yes; the NEV model was conceived to show, in a theoretical sense, that all of the elements are interlinked. In other words, an attack on one NEV *always* affects the others. This concept appears sound, but there is an argument against it.

In wars for national survival, or in what could be called a total war, one might have to destroy or neutralize every NEV the enemy has and then occupy his country before he will give up. In other words, given sufficient nationalistic or political willpower, the country could continue to down-shift, switch, or alter its sources of strength until everything is destroyed or made so utterly useless as to render the country incapable of functioning. Germany (and, perhaps, Japan) at the conclusion of World War II is an example of this type of situation. Related to this point, and warranting separate consideration, is America's ethnocentric world view.

US military strategists view strategic paralysis and its impact through Western eyes and against an environment that assumes and heavily relies on rational decision makers. It is hard to understand why a country would continue to hold on in spite of the fact that it was strategically paralyzed and facing unimaginable hardships. Looking once again to Iraq for illustration, most Americans could not understand why Hussein would not yield his position in Kuwait in the face of mounting casualties and inevitable paralysis. His willingness to sacrifice many thousands of his people to make a point was unconscionable for Americans. Yet, in the end, even Saddam acquiesced, albeit at a far greater cost than one might have thought necessary.

Strategic paralysis assumes that no rational leader would sit by and let his country be systematically taken apart. But, in fact, this strategy can fail if imposed on an irrational leader or against a value system that is not understood. A culture incapable of appreciating, or unable to implement, a paralysis strategy may look upon an opponent who does so as inferior. Such a country might wonder why its military was not the focus of attack and view the pursuit of this more humane strategy as a weakness.[28] It is an unfortunate fact that some societies have little regard for human life and individual freedoms. Strategic paralysis may not work in such cases, and a more violent strategy may be required. The choice of strategy will depend to a large extent on the quality, depth, and understanding of intelligence information.

The Importance and Role of Intelligence

The fourth and final assumption concerning the NEV model is the availability of good intelligence. It has been said that airpower is targeting

and targeting is intelligence.[29] If true, intelligence becomes the *sine qua non* of airpower. Quality intelligence is crucial because it provides the foundation upon which the determination of the enemy's most vital targets rests. Without good intelligence, effort will be wasted, the conflict extended, and the costs increased.

For strategic paralysis to work, timely and precise intelligence of all types is essential.[30] In fact, the intelligence function may soon become the most important element in airpower, next to weapons and armaments themselves. As Charles de Gaulle so succinctly put it, "A general with an excellent army most carefully deployed for battle will yet be defeated if he is insufficiently informed about the enemy."[31]

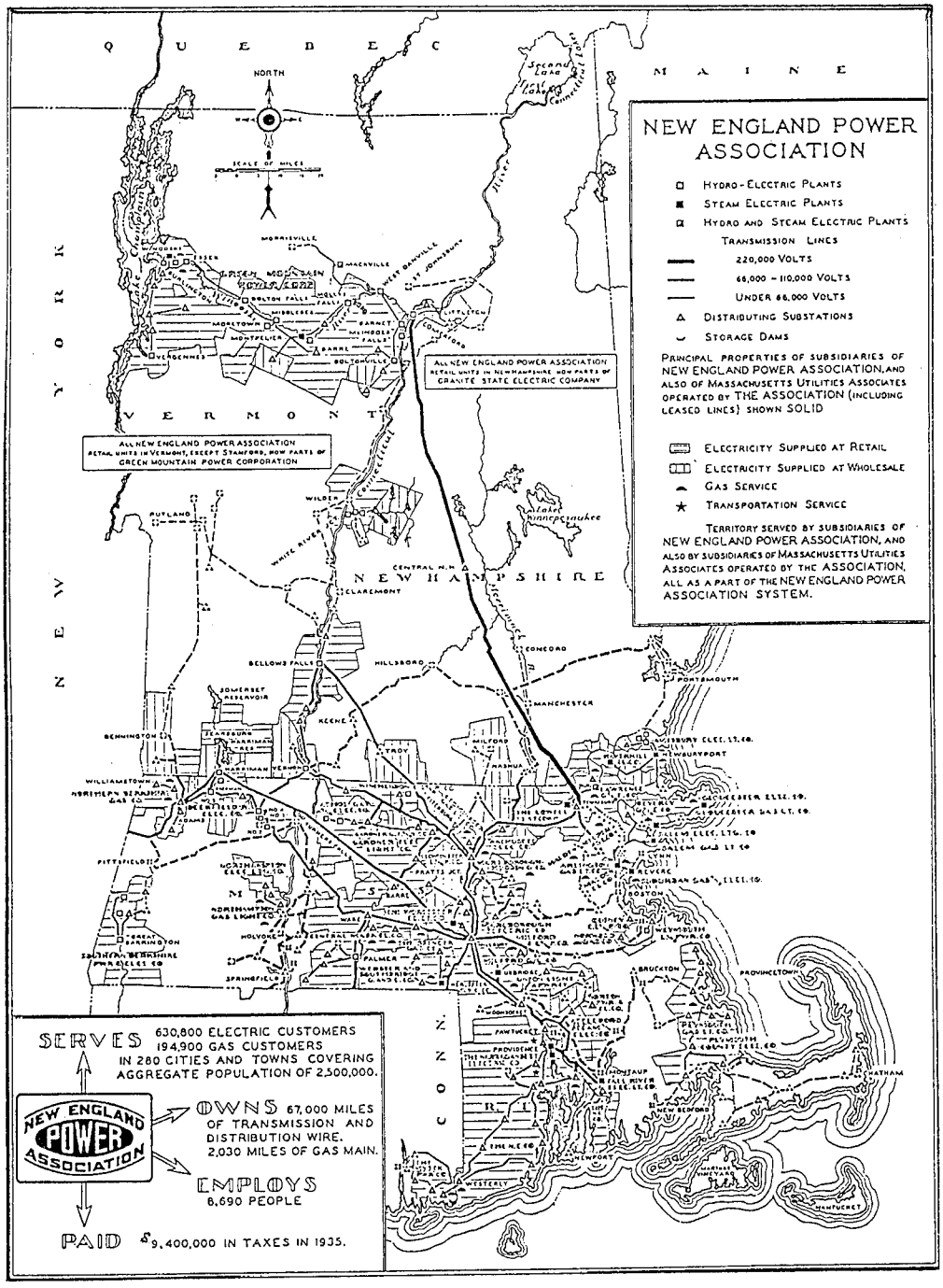
It is ironic that the military necessity for airpower was born out of a need for better intelligence. Yet, now, airpower is more dependent on intelligence than intelligence was ever dependent upon it. Unfortunately, this critical relationship (airpower's dependence on intelligence) is not always given its due. Air historian Asher Lee is even harsher in his criticism: "It seems that once strategic bombing becomes a focal point of strategy, air leaders feel the necessity of attacking some target system, however vaguely defined the purpose."[32] He goes on to say.

> One of the most important lessons of strategic bombing which still has to be learnt [sic] fully is that target priority systems are meaningless unless target intelligence is hard and up-to-date. . . . There are many ways to kill a cat, but one way per cat should be good enough. Intelligence and strategic bombing go together like Darby and Joan. . . . And if a strategic bomber commander does not know accurately the damage he has inflicted, how can he answer the question: "Which targets do I attack next?"[33]

Airpower's thirst for viable intelligence is nothing new. In the 1930s, the Air Corps Tactical School advocated analyzing the vulnerabilities of national economic structures, and the need for "painstaking investigation" into these areas, *before* they would be necessary.[34] To accomplish this, the school recommended the early involvement of the economist, the statistician, and the technical expert to ascertain the vital links most susceptible to, and worthy of, destruction from the air. The intelligence required for this treatment can be quite formidable. Figure 11, a literal "wiring diagram" of the New England Power Association, was used in an ACTS lecture on this subject.[35] It provides a glimpse at the seriousness and level of detail sought by the ACTS in its analysis. In fact, the whole notion of the industrial web theory of targeting seems to hang on the need for proper intelligence.

The Industrial Web Theory of Targeting and Intelligence.[36] The industrial web theory was a giant step forward in airpower targeting, since most industrial nations are as structured and as vulnerable as the United States. But could an industrial nation committed to preparing for war (in spite of the costs) disperse, duplicate, hide, or harden its industry to such a degree as to confound any strategic paralysis campaign? The answer to this question is unknown. It appears as if North Korea and the Soviet Union were headed in that direction with their massive efforts at using underground

Figure 11
From ACTS Lecture on the "National Economic Struture"



facilities. The US is in its current position because of it geographic position and the nature of its capitalist system. The US has never really been threatened by attack, except from ICBMs, and has never felt the necessity to take the precautions a European country might consider prudent.

The bottom line is that the US cannot assume that other nations will be as dependent or vulnerable on certain industries as we are. That is why intelligence is needed to evaluate each country's NEVs in light of the situation. Other industrial nations may be as dependent on electricity as the US, but a country willing to pay the price for redundancy will not suffer as much when known electrical production plants are destroyed. For example, no one suspected that Iraq possessed a triple redundant communication network to the south. It was thought, as might be expected in the US, that taking out Iraq's telephone switching center would leave only radio transmissions, which could be jammed. It did not occur to the forces until later (when another cable system was discovered) that Iraq had another backup. Why would any nation go to such expense unless it was anticipating conflict? The point once again is that current intelligence on the enemy provides the best way to determine which NEVs are vulnerable to air attack.

In the previously mentioned (and also highly detailed) ACTS report on targeting Japan, Captain White states: "Steps should be taken to require military attaches to submit reports on the countries accredited on such subjects and in such detail as will facilitate the compilation of these studies. [And] that more active cooperation by intelligence agencies in peacetime be encouraged with such commercial organizations as the Standard Oil Company, General Electric, and General Motors Corporation in order to obtain the detailed information of foreign vital elements known to their representatives resident abroad." White concludes by stressing the need for better intelligence and stronger analysis. He states that detailed reports such as this should be the responsibility of the chief of staff, and that such reports should be completed for every major nation in the world.[37]

The British had an appreciation for good air intelligence as well. Air Marshal Tedder attributed the adoption of an area bombing strategy in World War II, in part, to the poor assessment of Germany's economic situation.[38] It was (erroneously) calculated that by attacking Germany's urban areas, as much as a third of Germany's total war output could be affected. The fact that production in most areas actually went up during these attacks points to the importance of intelligence in targeting.[39]

Gen Hap Arnold's report to the secretary of war in November 1945 sternly criticized the past concept of intelligence, stating that often the resources were insufficient to cover the requirements of modern war. Arnold argued that "detailed and moment-by-moment knowledge of all aspects of civilian and military activity, within the territory of an enemy or potential enemy is essential to sound planning in times of peace or war." The intelligence coverage, he added, also needed to be continuous, providing knowledge of the enemy's political, social, industrial, scientific, and military life. "Strategic air warfare can be neither soundly planned nor efficiently extended without a continuous

flow of detailed intelligence."[40] An article that appeared in *The (London) Times* on 2 November 1942 put it clearly enough: "The strategical aspect of intelligence is of the utmost importance. The Air Force is at present the only weapon which enables us to penetrate into the heart of Germany. It is not enough for the enemy to be hit hard and often; he must be hit in the right place, and the task of intelligence is to discover his solar plexus and to advise how his defenses can be evaded with the minimum cost."[41]

As General Arnold and the author of the article make clear, intelligence will have to provide much more than just enemy dispositions if it is to be useful in executing a strategy of strategic paralysis. If a society is to be paralyzed, its leadership, industry, economy, alliances, military, communication, and transportation elements (or combinations thereof) must be known and appreciated (remembering that what is valued by one may not be valued by another) along with its doctrine, values, and culture. Experts from many disciplines will be required to obtain and evaluate the broader collection of intelligence required to prosecute a war of strategic paralysis. Economists, industrial engineers, sociologists, regional specialists, and nuclear and chemical authorities, to name a few, will all be necessary. The enemy needs to be known better than ever before. However, in some respects it may become easier to acquire this knowledge. As the world grows closer and international dependencies mature, it will be harder for any country to keep a secret. Some of this information, which may not even be considered secret, will become important over time. For example, the location of fiber optic cables buried by a company 10 years prior might become important information to an aggressor. However, unless the information is continually collected, it might not be available in time of war. A proper intelligence foundation must be laid beforehand.

The Need for Detailed Intelligence. Precise weapons require precise intelligence. It would be foolish to load an airplane with PGMs and send it off against a city without any specific targets in mind. What are the enemy's industrial weaknesses? What are the details of his infrastructure? Where and how does communication occur, not only between his armed forces but with his industrial base, his population, and his allies? What are the redundancies in these systems? Where is the leadership likely to be located in time of war? What are the vulnerabilities of the command bunker, if one exists? The answers to these questions require detailed intelligence such as who designed and built the bunker, and whether blueprints are available.[42]

This elevated level of detail extends across all target sets and all NEVs. In prior wars, this level of detail was seldom required because the opportunity to exploit it was rare. But, given today's ability to hit with pinpoint accuracy, exact information is needed or effort is wasted. Technology, properly directed by intelligence, offers the means to protect innocent lives and limit collateral damage in a way not possible 30 years ago.

Fundamental to this discussion is an appreciation of the different types of intelligence required for different levels of war. Tactical information is needed to direct the aim of the gun. Operational information is needed to know the

weakest division. Strategic information is required for an in-depth knowledge of the enemy's national elements of value and which of these are likely to be most vulnerable and significant.

Summary

It has long been understood and appreciated that certain elements of every nation-state are more important than others in contributing to that country's ability and will to wage war. Since not all of these elements are of equal value, it is logical to determine which of the elements are key factors. Historical frameworks used in making this determination were reviewed. Of the strategic targeting theories surveyed, all sought the same end; that is, a set of targets believed to be most critical. From this review, seven elements inherent in every nation-state, their national elements of value, were proposed; leadership, industry, armed forces, the population's will or morale, transportation, communications and alliances. The importance and interplay of each NEV was then discussed individually, with emphasis on the potential value of each. A model was presented to more accurately reflect the dynamic nature of these elements within a nation-state, and specific attention was paid to the importance of alliance systems and their overall relationship to a country's NEV. Finally, the assumptions made in targeting NEVs to implement a strategy of strategic paralysis were reviewed.

Notes

1. As we move through this presentation, there are haunting responsibilities that come with the introduction of models. They are not presented for their own sake. "Improved decision making is the goal of model building. The ultimate justification for models must thus rest on their usefulness in aiding decision." Edith Stokey and Richard Zeckhauser, *A Primer for Policy Analysis* (New York: W. W. Norton and Company, 1978), 14. Put another way, this analysis (and we use the term lightly) is no substitute for judgment. Our intentions are to aid in isolating and highlighting those areas were judgment should be applied by indicating to the decision maker the interaction and potential significance of each NEV. I was aided in this area by an article written by Dr Alain Enthoven, "What Systems Analysis Is and Is Not," *Defense Management Journal* IV, no. 1 (Winter 1967–68): 12.

2. Agreement for this can be found in Joint Pub 3-07, *Doctrine for Joint Operations in Low Intensity Conflict,* October 1990, Test Publication, TMs [photocopy], I-7.

3. Quite obviously, these seven could be duplicated and split many different ways.

4. Cecil E. Combs, "The Air Offensive in Overall Strategy," *The USAF Air University Quarterly Review* 1 (Spring 1948): 15.

5. Hitler and Saddam Hussein are examples of possible singularly important NEVs. An interesting preliminary study into the instability generated by the fall of authoritarian leaders can be found in Richard K. Betts and Samuel P. Huntington, "Dead Dictators and Rioting Mobs: Does the Demise of Authoritarian Rulers Lead to Political Instability?" *International Security* (Winter 1985–86): 112; "Nondemocratic regimes usually have unreliable arrangements for the legitimate transfer of power, and doubts about how it can be accomplished smoothly

may increase the longer a single leader lasts in office. There is a widespread presumption that countries ruled for extended periods by authoritarian leaders degenerate into chaos when those rulers die and their special personal status no longer holds the lid on their countries' tensions. It is, however, also possible to assume the contrary." Unfortunately the study excluded (page 113) instances where political instability produced the overthrow or death of the leader as in a *coup d'etat*. This information would have been valuable since this is one of the desired outcomes of the strategy.

6. Thinking carefully about this issue becomes even more important when one is pursuing a strategy of strategic paralysis. In some cases it may be more desirable to leave the leadership unhurt, yet strategically paralyzed so that the conflict can be concluded at some point short of total devastation of the country. This idea was explored more fully in the section on Methodology and Mechanisms in chapter 2.

7. From Paul Kecskemeti, *Strategic Surrender* (New York, Antheneum, 1964), 24, as quoted in Thomas C. Schelling, *Arms and Influence* (London: Yale University Press, 1966), 128.

8. "By their very nature, targets of economic value are comparatively 'soft' targets at fixed, generally known locations making them easy to identify and acquire." Air Commodore Jasjit Singh, *Air Power in Modern Warfare* (New Delhi: Lancer International, 1985), 158.

9. Although somewhat dated, this information was obtained by the author while on a classified tour of a military facility in the Summer of 1986.

10. Even worse, perhaps, is the effect on one's own prosperity after the war. Since the United States has an affinity for helping its past enemies, massive and widespread destruction of the enemy's industrial base (assuming, of course, it can be avoided) merely adds to the economic burden after the conflict. See Liddell Hart, *Thoughts on War* (London: Faber & Faber Ltd., 1944), 42. The entire passage was quoted earlier in chapter 2.

11. Thomas D. White, "Japan as an Objective for Air Attack," The Air Corps Tactical School, 1937–1938. Section 20 was entitled "Sources of Industrial Power." This appears to be a detailed research report. Captain White went on to become Air Force chief of staff in 1957.

12. It should also be mentioned that the targeting of electrical sources in Iraq was done with great care. Much greater destruction was possible. However, PGMs were used in such a way as to incapacitate the Iraqi power system only temporarily; we wanted to shock the patient, not create an invalid who would require extensive care after the war.

13. *The United States Strategic Bombing Surveys,* Summary Report of the European and Pacific Wars (Maxwell, AFB, Ala.: Air University Press, reprint 1987), 30.

14. Allies and trading partners are not necessarily synonymous. In situations where this is the case, the alliances NEV should be viewed under the broader label of "outside support."

15. Relationships between ethnic or racial groups *within* a country, for example the Kurds and Shiites of Iraq, are not considered alliances in a strategic sense, but they may very well be important at the operational level.

16. Was this the case in Germany in World War II? The Strategic Bombing Survey concluded that: "The attack on transportation was the decisive blow that completely disorganized the German economy." Disorganizing, though, is a far cry from total collapse. It would be difficult to credit the destruction of one particular target set (in this case their transportation network) with Germany's fall, given the simultaneity of attacks and the level of destruction across nearly all of Germany's NEVs. *The United States Strategic Bombing Surveys,* 30–33.

17. Col Dennis M. Drew, "After Desert Shield: Warfare from the 'Inside Out'," *Air Force Times,* 2 March 1992, 29; see also Lt Col David A. Deptula, "The Air Campaign: The Planning Process." Photocopy of the slides from this briefing obtained through Lt Col Ken Stanton of the Combat Employment Institute, Air University, 1992.

18. Mancur Olson, Jr., *The Economics of Wartime Shortage* (North Carolina: Duke University Press, 1963; reprint, Ann Arbor: University Microfilms International, UMI Out-of-Print Books on Demand, 1991), 17 (page references are to reprint edition).

19. Is every NEV capable of replacing every other NEV? This is a reasonable question, given my presentation and scant support of this concept. For example, how would transportation replace leadership or communications replace industry? The short answer is, they cannot. Only leadership can replace leadership; however, the other NEVs can help compensate for the loss of those leaders and facilitate their successors in a number of ways. Transportation can

move new leaders forward; communication can put them in touch with their population and government; alliances can recognize them; industry can support them, and so on. Thanks to Dr Bob Pape for assistance in this area.

20. Olson, 21.

21. Ibid., 141–47; "This adaptability applies fully as much to a loss of food, or raw materials, or other 'necessary' types of imports as it does to secondary or tertiary production" (page 142). Olson's thesis is that the production of skilled and versatile people is more important than the production of food or raw materials (for a modernized country) because it is people that come up with the clever ways to do more with less.

22. Maj Muir S. Fairchild, "National Economic Structure," lecture 1; see also his lecture entitled, "Primary Strategic Objectives of Air Forces." Typed manuscript (TMs), Lecture No. AF-14-C. Air Corps Tactical School, 11 April 1938, 6. From the USAF Historical Research Agency, Document No. 248.2019A-14. In this lecture, Fairchild states: "Now it seems from this discussion, that the governing factor must be the relative degree of vulnerability of the opposing nations and of their various classes of objectives. Certainly this degree of vulnerability will never be exactly the same and will usually be very different." Note: The ACTS used the term *Classes of Objectives* in much the same way we are using NEVs.

23. As previously quoted in chapter 1: "In countries subject to domestic strife, the center of gravity is generally the capital. In small countries that rely on large ones, it is usually the army of their protector. Among alliances, it lies in the community of interest, and in popular uprisings it is the personalities of the leaders and *public opinion*." (Emphasis added.) Carl von Clausewitz, *On War,* ed. Michael Howard and Peter Paret (New Jersey: Princeton University Press, 1976), 596.

24. Maj Alexander P. de Seversky, *Victory Through Air Power* (New York: Simon and Schuster, 1942), 101–2; the ACTS expressed a similar thought by stating that "airpower is the natural enemy of a well-organized state." From "a study of proposed Air Corps doctrine made by the Air Corps Tactical School, based upon information furnished by the War Plans Division, General Staff, in a memorandum, December 21, 1934," section III, 3.

25. Don't mistake this for the inability to properly *identify* what he holds dear. I'm assuming we have done the homework and, regardless of what *we* may think the value of the target is, have prioritized it according to his value system. (Of course, certain NEVs will be attacked, regardless of the value they place on them, in order to achieve paralysis—stopping his ability to hurt us and freezing his ability to continue with any aggressive behavior.)

26. Singh, xxxi.

27. John A. Warden III, *Planning the Air Campaign* (Washington, D.C.: National Defense University Press, 1988), 9..

28. Interviews taken with Japanese military officers shortly after the war serve to illustrate this point. The Japanese could not understand why Americans would be happy with their simple surrender. Many, in fact, awaited slaughter from US GIs after the documents were signed. When asked why they thought this, one officer replied, "because we would have done the same thing to you." When asked about the dropping of the bomb, the same officer said, "If we had had it, we would have used it on you." From comments made by Maj Rob Dillman, Maxwell AFB, Ala., 20 September 1991. His father, an American interviewer in World War II, passed these comments on.

29. Not surprisingly, AF Pamphlet 200-22, *Targeting Profession and Process,* agrees: "Air Force targeting is the intersection of intelligence and operations." I am indebted, once again, to Lt Col Phil Meilinger, for sharing his perspective on this topic with me. Interview by author, 25 September 1991, Maxwell AFB, Alabama.

30. For an excellent discussion on the importance of intelligence in applying airpower properly, see Haywood S. Hansell, Jr., *The Strategic Air War against Germany and Japan* (Washington, D.C.: Government Printing Office, 1986), chapter 1.

31. Charles de Gaulle, *The Edge of the Sword,* trans. Gerard Hopkins (1935) (New York: Criterion Books, 1960), 80.

32. Asher Lee, *Air Power* (New York: Frederick A. Praeger Inc., 1955), 20.

33. Ibid., 15–16; Darby and Joan were a male-female British entertainment team who were inseparable in their performances before the working-class crowd.

34. Fairchild, "National Economic Structure," 10.

35. This map was found with the Fairchild, ACTS lecture on the "National Economic Structure," 5 April 1938, 26, HRC No. 248.2019 A-10, and appears to have been referenced during the later portion of the briefing when the importance of electrical power was discussed.

36. Interestingly, most of the industrial web ideas of the ACTS are repeated in current USAF targeting manuals; for example, in *Network Models in Targeting,* Air Force Pamphlet 200-18, vol. 1, October 1990, there is a similar, though generic, version of the ACTS' New England electrical network chart found in figure 11.

37. White, 36.

38. Asher Lee confirms this: "One of the biggest economic intelligence weaknesses of World War II was the failure of both British and American intelligence to estimate the German oil position." The decision to bomb these plants was not based on sound economic intelligence. Lee, 174–75.

39. Lord Arthur Tedder, *Air Power in War, The Les Knowles Lectures by Marshal of the Royal Air Force* (London: Hodder and Stoughton, 1947), 101–2.

40. Lee, 165.

41. Ibid., 169.

42. Obviously, I am not suggesting we obtain blueprints for every command bunker of every possible enemy country. I am saying, though, that the necessary groundwork must be laid in advance so that these answers can be found easily. As Captain White advocated, the process must be formalized at the level of intelligence required—or we risk not having what we need when the fighting starts.

Chapter 6

Conclusions—Strategic Paralysis
An Airpower Theory for the Present

The problems of war are marked by an obscurity which the human mind cannot pierce unaided. Its normal methods of examination and judgment are useless. At every turn, it is liable to be checked by some sudden twist, bewildered by some element which it has failed to take into account, misled by some unexpected development. Its clarity is clouded by innumerable complexities, and its logical processes can make little headway through the tangled strands with which it has to deal.

— Charles de Gaulle
The Edge of the Sword

There are four main thrusts to this paper: presenting strategic paralysis as a "new" strategy for warfare, defining the relationship between strategic paralysis and the more traditional strategies for war, deriving the conditions unnecessary for its successful application, and establishing a new way of thinking about a country's most important targets or national elements of value.

Strategic paralysis is an alternate way of fighting and winning wars through the use of airpower. Though not suited for every occasion, it offers an alternative to traditional strategies of either attrition or annihilation. The diagrams in figures 1 and 2 presented a framework in which to understand and appreciate this strategy's origins, merits, and limitations. Historically, battles of attrition were fought when neither side could achieve strategic superiority. The airplane promised the means (the force and mobility) necessary to break the deadlock of land warfare. However, as each side acquired more and more aerospace power, the battles of attrition merely moved to the skies. It was not until aerospace control could be achieved that true annihilative efforts between air powers could be undertaken. As the airplane improved and its weapons became more deadly, another strategy for its use became apparent that suggested a less costly way to wage war.

Strategic paralysis is an airpower strategy that focuses on a country's most critical targets—its national elements of value. Using all the advantages of high technology, strategic paralysis uses airpower to paralyze an enemy's ability and will to continue the fight. Four ingredients or conditions are required if strategic paralysis is to be successful: (1) the right targets; (2) high technology; (3) an enemy dependent upon a well-developed, modern, and vul-

nerable infrastructure; and (4) aerospace control. Of these, this paper concentrated on the topic of finding the best targets.

From Clausewitz's notion of a center of gravity to Douhet's idea of what constitutes an enemy's vital centers, the search for a quick and inexpensive victory has been a long one. The search is founded on the premise that not every target is of equal value; and since war is costly, it makes sense to identify those which mean the most. From this arose the notion of identifying the enemy's most important elements. These national elements of value are: leadership, industry, armed forces, the population's will or morale, transportation, communications, and alliances. To achieve strategic paralysis by attacking an enemy's NEVs, four assumptions have to be understood: (1) NEVs vary in importance from country to country; (2) all NEVs are interdependent—an attack on one is an attack on them all; (3) in considering NEVs, governments will act in a rational manner; (4) the attacker must have adequate intelligence to correctly assess these NEVs.

Desert Storm provided the first opportunity for use of a strategy that began to approach strategic paralysis. The 100-hour ground operation that resulted in an endorsement for this type of warfare.[1] While the US could have invaded at great cost, or "carpet-bombed Baghdad," it chose a surgical approach, attacking only the key NEVs of their country. By so doing, the conflict was shortened, casualties were kept lower on both sides, and money was saved.[2] This also appealed to most Americans, who naturally dislike long and bloody conflicts.

Any search for the right targets, however, must be punctuated by an understanding of the end-states desired. The ultimate goal in any armed conflict is to induce the enemy to change his behavior. This can occur in three ways (fig. 3): the enemy's key leaders can be removed, the government can be overthrown, or the government can be convinced to change its mind. Strategic paralysis, although applicable in all three, offers the most promise in compelling the leadership to acquiesce. If strategic paralysis warfare is to be employed successfully, a clear understanding of our war aims and objectives will be needed.

With increased efforts to pinpoint the necessary NEVs for attack, and a superior air force to exploit them, there is no reason why America cannot fully enjoy the benefits of this new type of warfare for many years to come.

Benefits of this Strategy

A strategy of strategic paralysis offers several benefits over those of attrition and annihilation. First, it is less costly. Liddell Hart, in *Thoughts on War,* uses the analogy of a boxing match as it related to World War II to express this point. Why would you try to defeat your opponent, he argued, by merely

battering and bruising him until he yields? It is likely to leave you exhausted and injured. "An intelligent boxer aims to strike a decisive blow as early as possible against some vital point—the jaw or solar plexus—which will instantly paralyze your opponent's resistance. . . . To ensure this paralysis, even actual damage is not necessary; fear of it may suffice. . . ."[3] Except for Mao's theory of protracted or guerrilla war (explained earlier), it is hard to imagine any military leader who, given the choice, would not deliberately pursue the quick and decisive battle.[4]

Alexander de Seversky, made a similar argument during World War II in his book, *Victory Through Airpower.* According to Seversky, the US should have gone directly for the heart of Japan.

> The irony of our war with Japan is this. Although the body and heart of the enemy are closer to our American mainland than any of his outlying limbs, we are grappling with those limbs and cannot strike at his heart. . . . To grasp the strategic layout, think of Japan as a giant octopus. Its body and its vital organs are in the Nipponese Islands proper. Its tentacles stretch out across thousands of miles into China, Malaya, the Indies, the Philippines, Guam, Wake. . . . If we were able to strike at the heart of this sprawling beast, at Japan itself, and knock it out there, all the tentacles would instantly fall limp. . . . But because we lacked the revolutionary boldness to prepare the appropriate strategy and weapons, we have no alternative but to attack the tentacles one by one.[5]

To further drive his point home, Seversky, like Liddell Hart, used the analogy of a human body to relate the benefits of striking an enemy's key components. Stating the obvious, Seversky argued that to put the human body out of commission, it was not necessary to riddle all of it with bullets. You could achieve the same objective, system paralysis, at a lesser cost and effort by piercing only the most vital organs and nerve centers. "In the sense," Seversky reasoned, "[the] industrial and power aggregates are vital organs of the national body; [and] their annihilation would incapacitate the entire nation."[6]

Another, and perhaps the most enticing, benefit to this type of warfare is that it resembles the way America likes to fight wars. America dislikes wars with high casualties (on either side), high cost, and long duration. Attacks from the air, besides the benefit of hitting the right targets, keeps exposure to the enemy at a minimum.

In the final analysis, a rational enemy will give up when the costs of continuing the conflict outweigh any potential benefits. Airpower's toughest challenge (as Douhet encountered) may be in educating future adversaries that when command of the air is lost, so is the conflict. Airpower has grown up and come of age. The old notion that conflicts can be resolved from the air, without annihilating the enemy, is now a real possibility. The challenge is to break through the mental barriers that obscure airpower's potential contributions. Failing to explore other strategies, like strategic paralysis, condemns us to wars that are more costly and inhumane. We were fortunate in Desert Storm; the next conflict may not turn out so favorably.

Notes

1. What is unfortunate is that so few Air Force officers in the right places vocalized a strategy of this type for Desert Storm. Colonel Warden expressed to the author his frustration in not finding more than a handful of Air Force general officers who were thinking of employing airpower in this fashion prior to his "revolutionary" air campaign plan. To have approached Desert Storm with only an Air-Land Battle mentality would have been unconscionable, given the situation. Airpower was clearly the weapon of choice in this engagement, and strategic paralysis was the best way to use it.

2. A case can be made (however weak) that this type of high-technology warfare is in fact much more costly than a less discriminating type of war where inexpensive weapons are used. This argument falls apart when comparing absolute damage suffered on *both* sides. The United States seems destined, and rightly so, to forever factor in the death and destruction imposed on the enemy, as well as itself, in any supposed economic calculus of war costs.

3. Sir Basil Henry Liddell Hart, *Thoughts on War* (London: Faber & Faber Ltd., 1930), 52.

4. At first, World War II German Army General Ludendorff appears to have been an exception to this statement, having said that he wanted to "bleed the enemy white" through continuous assaults, but this was a course of action taken out of desperation.

5. Maj Alexander P. de Seversky, *Victory Through Air Power* (New York: Simon and Schuster, 1942), 337.

6. Ibid., 102–3.

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